Effects of Corporate Governance Quality and Ownership Structure on Stock Liquidity: Evidence from the Alternative Investment Market (AIM)

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Abstract

This study examines the impact of corporate governance quality, ownership structure and ownership identity on the stock liquidity of public firms in the UK. The research uses a sample of 595 firms from the non-financial sector listed on the Alternative Investment Market (AIM), a sub-market of the London Stock Exchange, over a seven year period from 2010 to 2016. In particular, the main objective of this study is to investigate the effect of corporate governance quality, ownership structure and ownership identity on stock liquidity in the FTSE AIM All-Share Index. After controlling for endogeneity problems, i.e. unobserved heterogeneity, simultaneity and dynamic endogeneity by using the application of dynamic panel model (system GMM), this research finds that corporate governance quality, ownership structure and ownership identity are significant determinants of stock liquidity in the AIM.

This study constructs a corporate governance quality index by following the guidelines and principles of the Quoted Companies Alliance (QCA). The index of this study contains 40 variables which are distributed across four main governance categories: board composition, board committees, board transparency, and remuneration policy structure. This study finds that corporate governance quality is positively related to stock liquidity. In addition, the finding holds across the four governance categories: board composition, board committees, board transparency and remuneration policy structure. Besides this, based on the mediation model of the Baron and Kenny (1986), the study finds that corporate governance quality affects stock liquidity through information disclosure. In particular, firms with higher corporate governance quality tend to enhance their information disclosure, which in turn improves stock liquidity.

Regarding ownership structure, it is evidenced that insider ownership, institutional ownership and ownership concentration have negative relationships with stock liquidity. In contrast, number of institutions and minority shareholders have a positive relationship with stock liquidity. Furthermore, as found in the third empirical study, this study found significant effects of different ownership identity on stock liquidity. In particular, free float ownership, foreign ownership and pension fund ownership are found to positively influence stock liquidity, whereas cross-holding ownership, employee ownership, investment bank ownership and other-holding ownership have negative relationships with stock liquidity. The findings of this study provide implications for UK regulators, AIM firms' management teams and AIM firms' stakeholders and especially shareholders.

Declaration

I here announce that each part of this thesis is my own work. I also announce that no part of the thesis has been formerly provided for a degree qualification in any other university.

Abdulateif Almulhim

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Chapter 1 Overview of the Research

1.1 Introduction and Background

Creating liquidity among assets traders is considered to be one of the main aims of capital markets (Tran et al., 2018). In this regard, "Investors want three things from the markets: liquidity, liquidity and liquidity" (Handa and Schwartz, 1996, p. 44). However, not all stock markets can be liquid or have sufficient amount of liquidity to absorb all buy and sell orders. In particular, prior studies indicate that small and medium-sized firms tend to experience stronger illiquidity effects than large and well-established firms (e.g., Amihud, 2002, Kini and Mian, 1995). Logical reasons behind this may be that only small numbers of shareholders trade these small stocks, which may lead to lower trading activity (e.g., low trading volume) for these firms; or it may be explained by the higher information asymmetry in these firms (e.g., the probability of trading based on superior information) (Brockman et al., 2009, Iskandrani et al., 2015).

Illiquidity can affect both firms and market levels. In detail, lack of liquidity in the stocks can restrict trading activities in the markets, which may increase risk (Cooper et al., 1985) and trading costs (Barclay et al., 1998). Investors in turn may require higher premiums to hold illiquid stocks due to the higher risks they bear. This may increase the firm's cost of equity (Butler et al., 2005), and therefore influence the value of the firm (Fang et al., 2009). Regarding market levels, illiquid stocks can put downward pressure on stock market efficiency (Chung and Hrazdil, 2010), which may ultimately negatively influence the financial stability of stock markets.

Considering this important phenomenon, this thesis investigates three crucial determinants of stock liquidity – corporate governance quality, ownership structure and ownership identity – in an emerging, growing and influential stock market that is considered the most successful growing market in the world – the Alternative Investment Market (AIM).

Corporate governance has received great attention from academics, practitioners and policymakers since recent financial scandals and the collapses of small and large firms worldwide, such as the collapse of Enron Corporation and the Waste Management scandal in the United States, and the collapses of Bank of Credit and Commerce International and Anglo Irish Bank in the UK. Those events highlighted the importance of corporate governance based

on its core functions of maintaining the cohesiveness of corporations by preventing expropriation of the resources of the firm by insiders, protecting the interests of shareholders and increasing levels of transparency, accountability, etc. The recent global financial crisis of 2007–2009 also led to a heated debate on the effectiveness of corporate governance around the world and simultaneous urges for the development of more efficient corporate governance mechanisms.

The aftermath of the global financial crisis has led to a number of reforms in corporate governance codes. For instance, the Financial Reporting Council (FRC) has replaced the Combined Code (2009) with the UK Corporate Governance Code (2010).[1] The reforms also covered second-tier markets that place more focus on small and growing firms, such as the Alternative Investment Market (AIM). For example, in February 2010, the London Stock Exchange (LSE) revised Rule 19 of the AIM Rules for Companies by making all AIM firms release details in their annual accounts relating to remuneration for each director, incorporation share options, cash or non-cash benefits, as well as other long term incentive plans (LSE, 2010a).

Given the above, existing literature emphasises the importance of adopting effective corporate governance quality, since this plays a significant role in reducing the level of information asymmetry between insider and outside shareholders by increasing the level of corporate transparency (Chung et al., 2010, Ali et al., 2017). In more detail, according to agency theory, the concept of separation of ownership from control increases problems of asymmetric information between firm managers and shareholders, because the agent tends to possess relevant information that the other party (principal) does not (Jensen and Meckling, 1976). This asymmetric information as a result of agency separation may motivate firm managers to pursue their own interests instead of shareholders' interests, and to exploit the wealth of the firm for themselves. The behaviour of opportunistic managers (e.g. obtaining perquisites or overcompensation) can lead them to disclose selected information which is more favourable for them. This in turn can result in more asymmetric information (Ali et al., 2017). However, in order to mitigate such behaviour, mechanisms of corporate governance are needed to monitor agents' behaviour and hence protect shareholders' rights (Jiang et al., 2014).

[1] In responding to the global financial crisis, The UK Corporate Governance Code (2010) reviewed the Combined Code 2009 and suggested emphasising two important elements: (1) more concentration must be paid to the spirit of the Code and its letter, and (2) the effect of shareholders in controlling and monitoring the Code must be improved by encouraging interaction between shareholders and boards (FRC, 2010a).

In this regard, prior studies have argued that the quality of corporate governance is considered to be a crucial determinant of stock liquidity (e.g., Al-Jaifi et al., 2017, Ali et al., 2017, Chung et al., 2010, Lei et al., 2013). In particular, those studies argue that effective corporate governance quality enhances both operational and financial transparency, which triggers a reduction in asymmetric information between insiders (e.g. firm managers) and external shareholders (e.g. large shareholders), as well as among external shareholders, and therefore improves stock liquidity (Chung et al., 2010). Furthermore, effective corporate governance is acknowledged as a means for accuracy assurance concerning the disclosed information, and hence for lowering information asymmetry, conflicts between the managers of the firm and shareholders, and the potential for expropriating minority investors and committing fraud. Consequently, informed agents will have fewer chances to access private information at the expense of external uninformed shareholders, which in turn can improve stock liquidity (Karmani and Ajina, 2012).

Another important channel that can affect stock liquidity is ownership structure. In this regard, prior studies have argued that the relationship between ownership structure and stock liquidity can be viewed from two standpoints. The first relates to adverse selection, and argues that informed ownership, such as insider ownership holds a high proportion of a firm's outstanding shares and has greater information in comparison to other shareholders. Thus, asymmetric information arises, which leads to reduced stock liquidity (Easley and O'Hara, 1987, Glosten and Milgrom, 1985, Grossman and Hart, 1986, Kyle, 1985). The second is the trading perspective, which claims that shareholders, typically institutional ownership, repeatedly turn over their portfolios. Their aggressive trading may reduce transaction costs, which leads to a positive influence on stock liquidity (Merton, 1987, Demsetz, 1968, Schwartz and Shapiro, 1992).

With regard to ownership identity and its impacts on stock liquidity, previous studies have argued that not all types of ownership identity can monitor firm management, due to their differences in levels of concentration (Næs, 2004, Jennings et al., 2002), fiduciary responsibilities and investment horizons (Chung and Zhang, 2011), behaviours (Coffee, 1991), and carrying the monitoring costs (Almazan et al., 2005). As a result, the effects of different ownership identities on stock liquidity vary from one to another (Chung and Zhang, 2011, Jennings et al., 2002, Fehle, 2004). For instance, Fehle (2004) found that banks and insurance

companies have adverse correlations with bid–ask spread, whereas mutual and pension funds have a positive relationship with bid–ask spread.

However, the AIM may have different characteristics for the three channels discussed above, compared to the main market of the UK. In particular, instead of the guidelines of the UK Corporate Governance Code that main market firms follow, the vast majority of AIM firms tend to comply with the Quoted Companies Alliance (QCA). The latter works on matters that influence small and growing firms (Mallin and Ow-Yong, 2012). The guidelines of the QCA Code are considered to be less detailed and prescriptive, as they are designed to be flexibly suitable for the natures, needs and structures of small corporations (Campbell and Tabner, 2014). Besides this, the composition of the ownership structure and ownership identity of the AIM may be different from those of the main market of the UK. In this regard, Ali et al. (2016) argue that AIM firms exhibit ownership structures that are different to those of main market firms. Furthermore, Mortazian et al. (2018) indicate that the AIM has low investor protection and high ownership concentration. This is not the case for the main market, where both investor protection and the level of ownership dispersion are high (Mortazian et al., 2018, Franks and Mayer, 2017, Porta et al., 1999). Thus, these differences between the AIM and the main market may lead to a difference in their effects on stock liquidity.

Given the importance of the topic of stock liquidity, this study aims to investigate three critical determinants: corporate governance quality, ownership structure, and ownership identity of stock liquidity in the AIM.

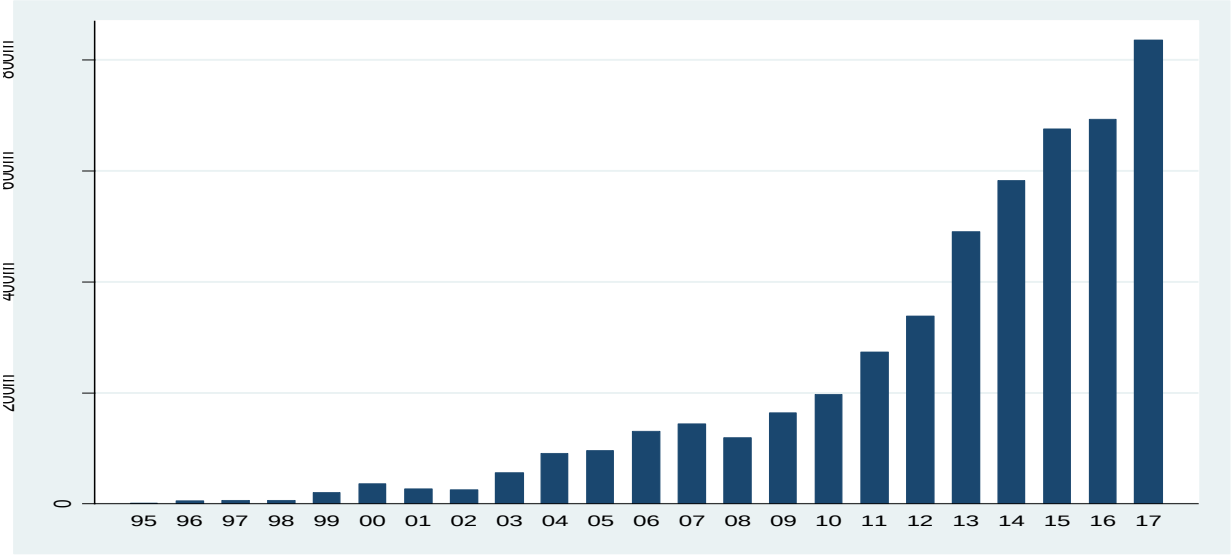
1.2 Research Motivations

Stock liquidity is a critical concept within the conventional finance literature, particularly the topics of asset pricing and market microstructure topics. Furthermore, literature also emphasises the importance of stock liquidity in corporate finance, such as firms' financial performance (Fang et al., 2009), corporate innovation (Fang et al., 2014), corporate cash holdings (Nyborg and Wang, 2014), and the bankruptcy risk of a firm (Brogaard et al., 2017). The concept of stock liquidity can be simply understood as the ability to buy and sell stock without significantly influencing stock prices (Chordia et al., 2005). Stock liquidity is critical, primarily because it affects how quickly investors can execute their buy and sell orders. Liquid markets are generally related to lower risk as there are always investors willing to take the other position. On the other hand, more volatile stock leads to more uncertain costs among investors,

which can cause a higher bid–ask spread, i.e. lower stock liquidity (Jegadeesh and Subrahmanyam, 1993).

However, a number of studies in the literature indicate that small and growing firms may suffer from a lack of liquidity. For instance, Board et al. (2015) and Litvintsev (2009) indicate that the AIM is generally less liquid in terms of trading volume than the main market. Although liquidity on the AIM was initially severely restricted, this has not been the case in the last decade. The market has matured since its inception in the mid-1990s. The AIM not only survived the aftermath of the dot-com bubble and the recent financial crisis of 2007–2009, but it also thrived at the same time (as shown in Figure 1.1).

Figure 1.1 Means of Trading Volume



Source: London Stock Exchange, historical AIM statistics (2017).

Considering the growth and prosperity of the stock liquidity of the AIM, it is important to understand how corporate governance and ownership structure are associated with stock liquidity. Corporate governance quality is considered one of the crucial determinants of stock liquidity. This is because corporate governance mechanisms mitigate agency conflicts (Lei et al., 2013), protect shareholder rights and prevent expropriation of the resources of the firm by large shareholders (Jiang et al., 2014), improve operational and financial transparency (Prommin et al., 2014), mitigate asymmetric information (Ali et al., 2017) and decrease adverse selection problems and therefore enhance stock liquidity (Lei et al., 2013, Prommin et al., 2014). However, the relationship between corporate governance quality and stock liquidity has received little attention in the literature. In this regard, Chung et al. (2010) state that the

relationship between internal corporate governance quality and stock liquidity has been empirically under-studied.

Upon reviewing the prior studies in the corporate governance literature, it is apparent that corporate governance has been mainly studied alongside stock return, cost of capital and firm value (e.g., Shleifer and Vishny, 1997, Porta et al., 2000, Mitton, 2002, Gompers et al., 2003, Bebchuk and Cohen, 2005, Bebchuk et al., 2009, Ho, 2005, Ashbaugh-Skaife et al., 2006, Masulis et al., 2007). However, there is a paucity of studies investigating the effects of corporate governance quality on stock liquidity (See, Al-Jaifi et al., 2017, Ali et al., 2017, Chung et al., 2010, Lei et al., 2013, Prommin et al., 2014).

On the same research stream, ownership structure is also considered an important determinant of stock liquidity. For instance, ownership concentration may be considered a solution to mitigate agency problems in large firms (Shleifer and Vishny, 1997). Nevertheless, it contributes to reduced stock liquidity by accessing private information through monitoring the firm's management (Heflin and Shaw, 2000). In contrast, although firms with more minority shareholders tend to have higher stock liquidity due to the trading activities on those firms' shares being more vigorous (Bolton and Thadden, 1998, Amihud et al., 1999), the likelihood of less effective corporate control and higher agency conflicts in those firms is higher, because those minority shareholders only possess a small stake in the firms and therefore it is difficult and/or there is probably no sufficient incentive for them to monitor the firm's management (Ragazzi, 1981).

However, upon reviewing the prior studies on ownership structure and stock liquidity, it is apparent that these studies have focused on the relationship between some types of ownership structures and stock liquidity, such as the effect of ownership concentration on stock liquidity (Heflin and Shaw, 2000, Gaspar and Massa, 2007, Ginglinger and Hamon, 2012), the effect of institutional ownership on stock liquidity (Jennings et al., 2002, Fehle, 2004, Jiang et al., 2011, Blume and Keim, 2012, Poon et al., 2013, Ajina et al., 2015, Tran et al., 2018) and the effect of insider and institutional ownership on stock liquidity, whilst ignoring ownership concentration (Chiang and Venkatesh, 1988, Sarin et al., 2000, Dennis and Weston, 2001).

However, only a few studies have jointly investigated the association between insider ownership, institutional ownership, ownership concentration and stock liquidity (Kini and Mian, 1995, Comerton-Forde and Rydge, 2006, Rubin, 2007, Iskandrani et al., 2015). Besides

this, the relationship between ownership dispersion and stock liquidity has received little attention from prior studies, with (Jacoby and Zheng, 2010, Wang and Zhang, 2015) being two examples. This study in turn argues that combining these ownership structure variables into one study may contribute to better understanding of their role in affecting stock liquidity. This study therefore aims to investigate the effects of insider ownership, institutional ownership, ownership concentration and minority shareholders on stock liquidity.

The third determinant of stock liquidity being studied in this thesis is ownership identity. A number of empirical studies have found different effects of different types of ownership identity on stock liquidity (Jennings et al., 2002, Næs, 2004, Chung and Zhang, 2011, Fehle, 2004). For instance, Næs (2004) concludes that large non-financial ownership tends to impose negative effects on stock liquidity, whereas large foreign ownership has a positive association with stock liquidity. Similarly to ownership structure studies, previous studies on ownership identity and stock liquidity have focused on certain types of ownership identity, as follows: the effect of foreign ownership on stock liquidity (Dahlquist and Robertsson, 2001, Ding et al., 2017, Rhee and Wang, 2009, Ng et al., 2016, Deng et al., 2018), the effect of employee ownership on stock liquidity (Brockman et al., 2009), the effect of free float ownership on stock liquidity (Ding et al., 2016) and the effect of some types of ownership identity, e.g. insurance companies, commercial banks, investment companies and independent advisers, on stock liquidity (Jennings et al., 2002, Barabanov and McNamara, 2002, Fehle, 2004, Poon et al., 2013, Liu, 2013).[2]

This study in turn argues that combining these ownership identity variables into one study may contribute to better understanding of their roles in affecting stock liquidity. This study therefore aims to investigate the effects of free float ownership, investment bank ownership, foreign ownership, government ownership, pension fund ownership, employee ownership, cross-holding ownership and other-holding ownership on stock liquidity.

In addition, upon reviewing prior studies on corporate governance quality, ownership structure, ownership identity and stock liquidity, it is obvious that the AIM has been ignored even though it possesses characteristics that are different from those of other stock markets. In other words, the AIM, a sub-market of the UK's main market, is considered the most successful growth market in the world. The success of the AIM can be attributed to (1) the light-regulation regime

[2] Næs (2004) and Tran et al. (2018) focus mainly on two types of ownership identity – foreign ownership and state ownership – whereas Ajina et al. (2015) focus on bank ownership and pension funds.

and disclosure requirements, (2) the voluntary adoption of corporate governance, (3) the supervisory role of nominated advisers (NOMADs), (4) the low costs and requirements for listing, (5) the benefit of the AIM's location in London and (6) the high number of international firms from different countries around the world (Arcot et al., 2007, Mallin and Ow-Yong, 2012).

Given the above explanation of the importance of stock market liquidity, corporate governance quality, ownership structure and ownership identity, this study seeks to empirically understand how corporate governance quality, ownership structure and identity influence stock market liquidity in the AIM.

1.3 Research Objectives

Previous studies in the literature have found that corporate governance quality, ownership structure and identity are crucial determinants of stock liquidity. However, the effects of these factors on stock liquidity are still inconclusive. With regards to the relationship between corporate governance quality and stock liquidity, this relationship is still inconclusive due to differences in corporate governance practices across countries and across firms (Doidge et al., 2007). In particular, board composition, one of the most important governance mechanisms, varies significantly across countries. For instance, in the US system, the majority of board members are outside directors rather than insiders. In contrast, the boards of most UK firms comprise a majority of insiders and a minority of outside directors. In Austria and Germany, board structure is mostly characterised by a two-tiered board. The first board (*Vorstand*) is the firm's executive board and the second board (*Aufsichtsrat*) is the outside supervisory board of the firm (Gillette et al., 2008).

Given these divergences, investigations on corporate governance mechanisms at the country level are encouraged. According to agency theory, managers and executive directors tend to exploit firms' resources in order to achieve their own interests instead of shareholders' interests. Since insider directors in the UK represent the majority of board members, as indicated by Gillette et al. (2008), outside directors may suffer in inducing insiders to adopt effective corporate governance.

Empirically, the relationship between corporate governance quality and stock liquidity has just recently been established in the US market by Chung et al. (2010), followed by Foo and Zain

(2010), Karmani and Ajina (2012), Lei et al. (2013), Prommin et al. (2014) and Ali et al. (2017), who implemented investigations in the Malaysian, French, Chinese, Thai and Australian stock markets respectively. The corporate governance mechanisms studied in these research projects are independent directors and audit committee (Foo and Zain, 2010), board composition and audit committee (Karmani and Ajina, 2012), board composition, management compensation and ownership structures (Lei et al., 2013) and board composition and its committees, i.e. audit, nomination and remuneration committees (Prommin et al., 2014, Ali et al., 2017). A general finding obtained is that higher corporate governance quality tends to be associated with higher stock liquidity.

In addition to corporate governance quality, the influences of ownership structure on stock liquidity also remain inconclusive. For instance, Kini and Mian (1995) find no relationship between insider ownership and the bid–ask spread on the New York Stock Exchange (NYSE). In contrast, Zhou (2011) finds that insider ownership and both quoted spread and effective spread are positively correlated on the NYSE. Chiang and Venkatesh (1988) indicate that institutional ownership has no relation to spread, and therefore does not influence stock liquidity on the NYSE. On the other hand, Rubin (2007) finds a positive relationship between institutional ownership and stock liquidity on the NYSE.

Furthermore, the influences of ownership identity on stock liquidity also remain inconclusive. For example, Tran et al. (2018) find that foreign ownership has no significant impact on stock liquidity on the Vietnamese stock market. In contrast, Deng et al. (2018) find that foreign institutional ownership has a negative correlation with stock liquidity on 39 stock markets. Park (2009) finds a negative relationship between pension fund ownership and stock liquidity in the main market of the UK. On the other hand, Poon et al. (2013) find that number of pension funds and proportion of pension fund ownership were negatively related to bid–ask spread before and during the financial crisis period in the US. That is, they positively affected stock liquidity.

There are two possible reasons behind the observed inconsistency of these relationships: (1) influences of stock market conditions at the time of the investigations, e.g. before, during and after the crisis, and (2) different characteristics of ownership structure and identity among stock markets (Tran et al., 2018).[3] For example, the composition of ownership structure and identity

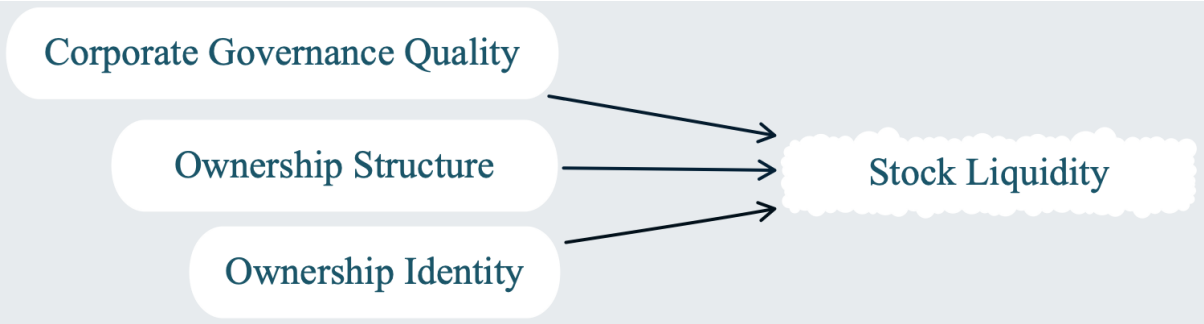
[3] In developed markets, institutional shareholders dominate other types of shareholders, whereas in emerging markets, individual shareholders may play a key role. Beside this, foreign shareholders may face restrictions on their participation in emerging markets, whilst they may freely join the developed markets (Tran et al., 2018).

of second-tier markets that place more focus on small and growing firms may be different from the main stock markets. In this regard, Kini and Mian (1995) argue that the impact of ownership structure is significantly different according to the size of firms.

Given the above, this study examines the impacts of corporate governance quality, ownership structure and ownership identity on the stock liquidity of firms listed on the AIM over a seven-year period from 2010 to 2016 (as shown in Figure 1.2). In particular, the main objective of this study is to investigate the effects of (1) corporate governance quality, (2) ownership structure (in particular insider ownership, institutional ownership, ownership concentration and minority shareholders), and (3) ownership identity (in particular free floating ownership, foreign ownership, investment bank ownership, government ownership, pension fund ownership, employee ownership, cross-holding ownership and other holding ownership), on stock liquidity[4] on the FTSE AIM All-Share Index. Therefore, in order to achieve the research objectives, this study aims to answer the following questions:

1. Does corporate governance quality influence stock liquidity on the AIM?
2. Does ownership structure influence stock liquidity on the AIM?
3. Does ownership identity influence stock liquidity on the AIM?

Figure 1.2 Research Objectives



1.4 Research Contributions

This study provides several contributions to the literature regarding the relationship between corporate governance quality, ownership structure, ownership identity and stock liquidity, as follows:

[4] This study follows Stoll (2000) and uses two proxies of stock market liquidity: informational and real friction. Informational friction is defined as "the potential losses of trading against informed traders", whereas real friction is defined as "the real resources used up in the liquidity-provision process" (Brockman et al., 2009, p. 1404).

First of all, with regard to the relationship between corporate governance quality and stock liquidity, there is limited empirical evidence around this relationship, as the topic has just recently begun to receive attention from academic researchers beginning in 2010, particularly by Chung et al. (2010). At first glance, the preceding literature in this area has been published in France (Karmani and Ajina, 2012), Australia (Ali et al., 2017, Al-Jaifi et al., 2017) and emerging stock markets such as Malaysia, China and Thailand (Foo and Zain, 2010, Lei et al., 2013, Prommin et al., 2014, Al-Jaifi et al., 2017). However, to the best of the author's knowledge, the relationship between the quality of corporate governance and stock liquidity in the UK has not yet been studied. Therefore, this study is the first in the UK, and in particular the first on the AIM. As noted by Doidge et al. (2007, p. 2), "corporate governance varies widely across countries and across firms". Given that the AIM is an emerged and influential market, it is critical to learn about corporate governance quality effects on the stock liquidity of the FTSE AIM All-Share Index.

Additionally, this study aims to enhance the robustness of its findings on the researched matter by considering and addressing a number of limitations of previous studies. In particular, in the study of Chung et al. (2010), which observes a positive relationship between internal corporate governance quality and stock liquidity in the United States, the authors build their governance index by using Institutional Shareholder Services' (ISS) Corporate Governance. They claim to have selected 24 governance standards out of 51 standards suggested by ISS, because they believe that these 24 are the most relevant standards that are closely related to operational and financial transparency. The present study in turn argues that the selection of standards may involve subjective judgements and selective biases, which may affect the quality of the corporate governance index. Apart from this, ten standards of their choice (out of 24 standards) focus on anti-takeover provisions. Those anti-takeover provisions – for example poison pills – are relatively uncommon in the UK because of the effectiveness of the City Code on Mergers and Takeovers (Mizuno and Tabner, 2008). Therefore, it may not be appropriate to generalise the results obtained in the US for the UK.

Analogously, other studies in the literature, conducted in Australia (Ali et al., 2017), France (Karmani and Ajina, 2012) and emerging stock markets – namely Malaysia, China and Thailand (Foo and Zain, 2010, Lei et al., 2013, Prommin et al., 2014) respectively) – tend to focus on certain governance categories (e.g. only board composition and committees (Prommin et al., 2014, Ali et al., 2017, Karmani and Ajina, 2012) and a few governance standards (e.g.

only independent directors and audit committee (Foo and Zain, 2010). Moreover, it is apparent that most of these studies use ISS to construct their governance indices (Chung et al., 2010, Lei et al., 2013, Prommin et al., 2014, Jiang et al., 2014). However, the corporate governance quality index issued by ISS[5] is not appropriate for firms listed on the AIM, since these firms are considered small and growing in size, and therefore their structure, needs and nature are not the same as large firms. In this regard, ISS in its report mentions that, "The Quoted Companies Alliance Corporate Governance Code for Small and Mid-Size Quoted Companies (QCA Code) may be a helpful guide to good corporate governance practices for AIM-listed companies" (ISS, 2017, p. 6).

Therefore, unlike the prior studies mentioned above, this thesis contributes to the literature by constructing and designing a corporate governance quality index that is suitable for the nature, needs, size and structure of small and growing firms such as those listed on the AIM by following the guidelines and principles of the QCA Code.[6] The index contains 40 governance standards contained in the QCA Code. These standards are distributed across four main categories: board composition, board committees, board transparency, and remuneration policy structure.

Besides this, a widely accepted argument in the literature is that control and monitoring by effective corporate governance mechanisms can reduce agency conflicts through higher level of information disclosure (e.g., Huang and Zhang, 2012, Renders and Gaeremynck, 2012). In this regard, prior studies have argued that firms with higher corporate governance quality tend to enhance their information disclosure, which in turn improves stock liquidity (e.g., Ali et al., 2017). Thus, in addition to the direct investigation of the relationship between corporate governance quality and stock liquidity, this thesis contributes to the literature by examining whether corporate governance quality improves stock liquidity through the enhancement of information disclosure. To do this, the study employs the Baron and Kenny (1986) four-step mediation model.

Second, the investigation of the UK AIM also contributes to the study of ownership structure, ownership identity and stock liquidity, as the vast majority of prior studies have been conducted

[5] ISS is considered the leading provider of corporate governance worldwide, where it covers 115 markets. For more information, see https://www.issgovernance.com/about/about-iss/

[6] The LSE also supports the guidelines of the QCA Corporate Governance Code, and recommends AIM firms adhere to the QCA as follows: "As a minimum, all AIM companies are encouraged to adhere to the QCA Guidelines, which are based on the Code but specifically tailored to the needs of growth companies and their investors" (Cronin et al., 2012, p. 4).

in the US market – see for example (Brockman et al., 2009, Fehle, 2004, Heflin and Shaw, 2000, Jacoby and Zheng, 2010, Kini and Mian, 1995, Poon et al., 2013, Rubin, 2007). Specifically, the UK market differs from the US market in several areas, such as governance practices, disclosure and regulations. Particularly for the ownership structure in the UK, any identity which possesses 3% or more is required to disclose their holdings if they increase that holding by 1% during a period of two to five days. On the other hand, a slightly different ownership structure is present in the US. Any identity which possesses 5% or more is required to disclose their holdings if they increase that holding by 1% or more during a period of ten days (Short and Keasey, 1999). This indicates that the UK's disclosure requirements appear to be tighter than those of the US. Moreover, the definition of insider ownership is different between the UK and the US. In the UK, insider ownership does not include large shareholders and employees; instead, it only includes both executive and non-executive directors. In contrast, Fidrmuc et al. (2006) state that the concept of insider ownership in the US includes directors, officers, large shareholders, and employees who hold 10% or more of the firm's shares.

To the best of the author's knowledge, there are only two studies which have focused on the main market of the UK (Iskandrani et al., 2015, Park, 2009). However, this study is the first regarding ownership structure, ownership identity and stock liquidity in the AIM. In this regard, the composition of ownership structure and investor protection for the AIM may be different from both the US and the main market of the UK, where the latter markets are characterised by high investor protection and high ownership dispersion (Franks and Mayer, 2017, Mortazian et al., 2018). The AIM, in contrast, has low investor protection and high ownership concentration (Mortazian et al., 2018). Besides this, the Office for National Statistics states that, "AIM companies had different patterns of ownership to main market companies" (ONS, 2015, p. 23). Thus, it is critical to learn about ownership structure and ownership identity effects on the stock liquidity of the AIM.

The third contribution of this thesis is related to the methodology and estimation methods being employed; previous studies in the literature have argued that corporate governance is endogenously determined (Wintoki et al., 2012, Hermalin and Weisbach, 2003, Ali et al., 2017), as is the ownership structure (Heflin and Shaw, 2000, Rubin, 2007, Poon et al., 2013, Ajina et al., 2015). However, findings from most earlier studies regarding the relationship between corporate governance and stock liquidity may be influenced by endogeneity problems,

especially dynamic endogeneity (Chung et al., 2010, Karmani and Ajina, 2012, Lei et al., 2013, Prommin et al., 2014, Jiang et al., 2014), as well as ownership structure and stock liquidity (Brockman et al., 2009, Chiang and Venkatesh, 1988, Heflin and Shaw, 2000, Iskandrani et al., 2015, Jacoby and Zheng, 2010, Kini and Mian, 1995, Poon et al., 2013).

Therefore, this study addresses the problem of endogeneity by following the methodology employed by Wintoki et al. (2012) and Akbar et al. (2017), and applies the generalized method of moments (GMM). In particular, this study applies the two-step GMM dynamic panel estimator. The two above-mentioned studies argue that traditional methods, such as fixed effects or ordinary least squares (OLS), may be not effective in controlling all endogeneity problems, particularly dynamic endogeneity. In contrast, system GMM is more able to control the three types of endogeneity problems suggested by the literature, which are simultaneity, unobserved heterogeneity and, most importantly, dynamic endogeneity (Wintoki et al., 2012, Akbar et al., 2017, Akbar et al., 2016). Thus, controlling for these endogeneity problems can contribute to the study of corporate governance, ownership structure, ownership identity and stock liquidity in attaining more consistent and accurate results.

1.5 Thesis Structure

This thesis is structured in eight chapters. Chapter 1 provides a brief introduction and motivation, and outlines the objectives and contributions of the whole thesis. In more detail, Chapter 2 provides an overview of the AIM as the institutional setting for this study. The chapter discusses in detail the creation, characteristics, attractiveness, regulation and disclosure, corporate governance, nominated advisers and ownership structure of the AIM.

Chapter 3 provides both theoretical framework and empirical studies that relate to corporate governance quality, ownership structure and stock liquidity. The first part, discussing the theoretical framework, starts with a discussion of agency theory, including its causes and solutions, and its relationship with stock liquidity. Subsequently, stakeholder theory and stewardship theory are discussed. The second part of the chapter separately reviews the prior empirical studies of the relationship between corporate governance quality and stock liquidity, ownership structure and stock liquidity and ownership identity and stock liquidity. Chapter 4 provides detailed descriptions of the data-collection process, as well as the measurements and definitions of stock liquidity, corporate governance quality, ownership structure, ownership identity and control variables. Furthermore, this chapter discusses the research methodology

and research method employed (i.e. the system GMM). Also, this chapter debates and addresses the potential econometric problems that may arise in the dataset.

Chapter 5, Chapter 6, and Chapter 7 empirically investigate the influences of corporate governance quality, ownership structure and ownership identity, respectively, on stock liquidity. In detail, each chapter starts with the discussion of the hypothesis development of the tested association. Next, the chapters provide the descriptive statistics of all employed variables, as well as the empirical findings for each research question and the additional tests for verification of the robustness of the obtained results. Finally, Chapter 8 provides a brief summary of the entire contents of the thesis, including the empirical findings. Furthermore, this chapter discusses the limitations, implications and contributions of this study. Besides this, it provides recommendations for future studies.

Chapter 2 Overview of the Alternative Investment Market

2.1 Introduction

This chapter discusses the primary contribution of this thesis by employing the Alternative Investment Market (AIM) as the institutional setting. The AIM possesses characteristics that are different from those of other stock markets. It is characterised by light-regulation regimes, low disclosure requirements, voluntary adoption of corporate governance code, and attracts firms that are small and growing in size. Also, according to the London Stock Exchange (LSE), the AIM is the most successful growing market in the world, as well as the largest junior market in the world by market capitalisation (Farag et al., 2014). However, before discussing the characteristics and features of the AIM, this chapter aims to take a look at other emerging and growing markets that have been established in other countries and which are somewhat considered competition to the AIM.

The structure of this chapter is organised as follows: Section 2.2 compares the AIM with other junior stock markets; Section 2.3 debates the creation of the AIM, its characteristics and attractiveness; Section 2.4 discusses the regulation and disclosure of the AIM; Section 2.5 and Section 2.6 illustrate the corporate governance and the nominated advisers of the AIM, respectively; Section 2.7 discusses the ownership structure of the AIM, and finally Section 2.8 concludes this chapter with a summary.

2.2 A Comparison among Junior Stock Markets

Junior stock markets can have different modes of exchanges characterising them. Posner (2005) indicates that 'Compartiment Spécial' in France and 'Mercato Ristretto' in Italy were the first junior stock markets established in the 1970s in Europe. The two markets were characterised by having low information standards and low listing requirements. One purpose of establishing these markets was to feed and prepare these firms onto the official markets. However, both of them failed after the stock market crash in 1987. These markets were then replaced by the Euro New Markets (Euro.NMs) targeting high-tech companies, which included the Nouveau Marché in Paris, Nuovo Mercato in Milan, Neuer Markt in Frankfurt, Euro.NM Brussels and Nieuwe Markt in Amsterdam, to mention just a few. The listing requirements of the Euro New Markets were low in terms of size, profitability and age (Posner, 2005, Goergen et al., 2003). Nevertheless, all these European markets were closed as a result of: (1) the dot-com bubble

and (2) the inability of the Euro.NMs to harmonise different sets of listing rules. The involvement of different national regulators led to the separation of the Euro New Markets (Goergen et al., 2003, Granier et al., 2019).

Posner (2005) mentions that 20 new second-tier markets were created by 12 European countries between 1995 and 2005, modelled on the Nasdaq. However, most of them did not succeed and had to close down. After the experience of Europe's junior stock markets, several attempts were made by different countries worldwide to create second-tier markets that placed more focus on small and growing firms. For instance, three markets were created in Japan: (1) the JASDAQ in 1998; (2) the Market of the High Growth and Emerging Stocks (Mothers) in 1999; and (3) the Tokyo Pro Market (TPM) in 2009. The over-the-counter market was replaced by JASDAQ and Mothers. The two markets are characterised by concentrating the power on the side of the market operator instead of the intermediaries. In other words, there are no dedicated intermediaries in these markets and therefore the listing process is more costly and longer compared to other junior markets (Granier et al., 2019).

Besides this, the Tokyo Stock Exchange established the Tokyo AIM in June 2009. The Tokyo AIM was established as a joint venture between the London Stock Exchange and the Tokyo Stock Exchange. The system of this market replicates the UK AIM system with the same features. Like the UK AIM, the Nomads are responsible for firms. The Japanese Nominated Advisers (also called J-Nomads) have the same advisory roles as the Nomads of the UK AIM. Nonetheless, in 2012, the London Stock Exchange withdrew from the Tokyo AIM and therefore the Tokyo AIM became the TOKYO PRO Market.[7] The TOKYO PRO Market has not achieved the same success as the UK AIM because the number of admissions to this market was low. For example, two firms joined in 2012, one firm in 2013, two firms in 2014, four firms in 2015, one firm in 2016, and seven firms in 2016.[8]

Another form of junior stock markets is the Borsa Italiana's market, which was founded in 1997. In 2007, this market merged with the London Stock Exchange. The Borsa Italiana's market changed its name to AIM Italia in 2012. Similar to the AIM regulation, this market attracts small and growing firms with less stringent procedures and lighter regulations. In detail, there is no minimum or maximum requirement regarding the firms' capitalisation and free

[7] Tokyo Stock Exchange Website: http://www.jpx.co.jp/english/equities/products/tpm/outline/index.html
[8] See the Listed Companies: https://www.jpx.co.jp/english/equities/products/tpm/issues/index.html

float. The listed firms are supervised by a Nominated Adviser who is responsible for the health and integrity of the firm (LSEG, 2013).

Nasdaq First North is another form of market that cares for small and growing firms. It was launched in 2006. Similar to the UK AIM, firms can join the market regardless of their industry sector and country of origin. Furthermore, in order for a firm to be admitted to the market, it must have a Certified Adviser. This Adviser is responsible for supporting and guiding the firm in the listing process. This Adviser should also ensure that the firm continuously complies with the regulations and rules of the market.[9]

Given the above, it is apparent that many emerging stock markets worldwide attempt to replicate the idea of the AIM in their home countries, e.g. AIM Italia, Tokyo AIM, Nasdaq First North and Alternext Paris. This may be because of AIM's successes over 24 years. Although these junior stock markets are generally characterised by having light regulations in order to assist small firms with going public in their early life, some differences may exist between these emerging markets. For instance, European second-tier markets in general require a minimum number of shareholders and a minimum free float to ensure the liquidity of their markets, and firms must have a record of two years' ongoing business. Nonetheless, the UK AIM and markets that replicate the AIM platform have no criteria for the free float or the number of shareholders. Also, firms with a record of less than two years can be listed on their market (Granier et al., 2019).

Moreover, there are some differences in the regulations between the Japanese junior markets and the UK AIM. For example, both Mothers and JASDAQ are characterised by highly centralised power held only in the hands of the Japan Stock Exchange. Following the style of the NASDAQ, there are no dedicated intermediaries in these markets and the underwriter must accompany and assist the firm throughout the IPO process. Thus, the listing process is more costly and longer than in other junior markets. Besides this, these Japanese junior markets (except the TOKYO PRO Market, where it replicates the UK AIM system) are also characterised by stricter practices of corporate governance and requirements for information disclosure than the AIM (Granier et al., 2019). In contrast, all AIM firms must have a NOMAD throughout their existence on the market. The NOMAD plays an important role in the process of admission, evaluating a firm's overall suitability and appropriateness for the market

[9] Nasdaq First North Website: https://www.nasdaq.com/solutions/nasdaq-first-north-growth-market

(Khurshed et al., 2016). Also, the adoption of a corporate governance code by AIM firms is voluntary and it is subject to the concept of either "comply or explain". Therefore, there is no standard corporate governance for the AIM (LSE, 2016).

In addition, prior studies have found that few firms transfer from the AIM to the main market of the UK (Campbell and Tabner, 2014, Vismara and Paleari, 2012), compared with other emerging stock markets, such as Japanese junior markets (Mothers and JASDAQ) and First North, which are considered to be principal feeders for their main segments (Granier et al., 2019).

The empirical work of Granier et al. (2019) compared several junior stock markets, i.e. the UK AIM, AIM Italia, Alternext Paris, First North, Mothers, JASDAQ and the Tokyo Pro Market from 2013 to 2017. In general, they found that the UK AIM is the largest emerging stock market in terms of the number of listed firms and market capitalisation. The Japanese junior markets (together, Mothers, JASDAQ and Tokyo Pro Market) are the second largest markets, as they account for about 65% of the UK AIM market capitalisation. First North is third largest emerging market while AIM Italia and Alternext Paris are the most recent and smallest junior markets.

To sum up, although several junior stock markets were affected by the unobservable exogenous macroeconomic shocks, such as the dot-com bubble in the mid-1990s and the recent financial crisis of 2007–2009, the AIM has not only survived but also thrived. The successes of this market led several countries around the world to mimic the idea of the AIM.

Acknowledging the favourable characteristics and successes of the AIM, several markets worldwide have attempted to imitate it by adopting similar trading market platforms, such as the Alternext Paris market, the Nouveau Marché of France, NASDAQ First North, the Neuer Market of Germany and NMAX of the Netherlands, to mention just a few (see, Mendoza, 2008, Jenkinson and Ramadorai, 2013). However, little success was achieved, and the AIM remains the most successful and attractive among those competing markets. This thesis therefore employs the AIM as the institutional setting. Next section will discuss in detail how the AIM was created, its characteristics, attractiveness, regulation and disclosure, corporate governance and ownership structure.

2.3 The Creation of the AIM, its Characteristics and Attractiveness

Access to finance sources is the lifeblood of every business, regardless of its size and reputation, and has been challenging for the majority of firms. The emergence of stock exchanges has helped alleviate the problem. Nevertheless, not all firms can meet the criteria to become a public limited company, due to high barriers to entry (i.e. tough entry requirements, high costs and strict regulations). In order to overcome the issues of finance access for small firms, the LSE created the Unlisted Securities Market (USM) in the 1980s. The USM was created to cater for small firms which were unqualified for listing, by lowering the barriers of entry compared to those of the main market. For instance, the USM allowed firms with a history of three trading years, as well as 10% of their shares being in public hands, to join the market (BoE, 1983).

Despite the success of the USM in its first six years, it experienced a dramatic decline in the number of listed firms. This decline can be attributed to (1) the decline of stock markets worldwide in 1987 and the serious recession which occurred in the UK during the early 1990s,[10] (2) the new regulations imposed by the European Commission, which led to a reduction in the minimum trading period for firms on the main market from five to three years and on the USM from three to two years,[11] and (3) the decision made by the LSE to relax the listing requirements on the main market for biotechnology firms (no mandatory trading record) in 1991 at the venture capital community's request. These events damaged the advantages of the USM over the main market, and thus its attractiveness dramatically declined (Arcot et al., 2007, p. 12). In September 1994, the LSE announced the complete closure of the USM, and qualified firms were asked to move into the main market (BoE, 1994). The possibility of the disappearance of capital-raising facilities for growing firms, as well as demand by specialised brokers, investment banks and Conservative ministers, were the main reasons behind the establishment of the AIM (Arcot et al., 2007).

Since June 1995, the AIM has been developed as a sub-market of the LSE, and has mainly been for small and growing firms that wish to raise capital at their early stage (Khurshed et al., 2016). The AIM comprises firms operating in more than 100 countries and 40 different sectors,

[10] As a result, the new capital raised on the USM in 1991 was £11.6m, whereas it had been £308m in 1988.
[11] The greater visibility and prestige of the main market, as well as the relatively diminished difference in the minimum trading period between the two markets, led most of the qualified firms on the USM to wait another year to join the main market.

with a combined market capitalisation of over £70 billion at the end of 2015. Over 3,500 firms have joined this market, raising capital above £90 billion, since its launch in 1995 (LSE, 2015a).

The AIM comprises three indices: the FTSE AIM All-Share Index, the FTSE AIM 50 Index and the FTSE AIM 100 Index. The latter two indices contain the largest 50 firms and the largest 100 firms, respectively (LSE, 2005). Unlike other second-tier markets, such as Euro.NMs which concentrates exclusively on high technology firms,[12] the AIM covers ten main industries: Oil & Gas, Basic Material, Industrials, Consumer Goods, Health Care, Consumer Services, Telecommunications, Utilities, Technology and Financials. These industries are further sub-categorised into 42 sectors. For example, the Financials industry takes up eight sectors: Life Insurance, Real Estate Investment & Services and Financial Services, to mention just a few.[13]

Expanding its focus from UK domestic firms, the AIM welcomes international firms to participate. The number of international firms has continued to increase since the opening of the market. In particular, the number of international firms within the market increased from none in 1995 to 219 in 2014. However, the peak year for foreign firms was 2007, when there were 347 firms participating, suggesting that the global financial crisis adversely affected the listing activity of the AIM (Doukas and Hoque, 2016). According to the LSE, those international firms are from different regions around the world, e.g. Africa, Asia Pacific, Australia, Canada, USA and Western Europe, with total international funds of £23 billion, representing almost 30% of the total fund of the AIM in 2016.[14]

Notably, Doidge et al. (2009) mention that when the AIM is excluded from the LSE in the analysis, the NYSE had about 165% more international firms than the LSE in 2005, but this figure drops to approximately 59% if the AIM is included. This suggests that the AIM is an attractive investment pool for foreign capital, and the increasing participation of international firms in the LSE is largely attributed to the AIM.

It is relevant and crucial to focus this research on the AIM, primarily because of its recognisable success, resilience and high attractiveness. As previously discussed in this section, the AIM is

[12] Euro.nm is a Pan-European stock market containing firms from Amsterdam, Brussels, Frankfurt, Paris, and Milan (See, Bottazzi and Rin, 2002).
[13] LSE, AIM Statistics. See: https://www.londonstockexchange.com/statistics/historic/aim/aim.htm
[14] See AIM Country of Operation: https://www.londonstockexchange.com/statistics/historic/aim-country-of-operation-and-incorporation/aim-companies-country-of-operation.htm

characterised by a more flexible environment, e.g. lenient regulation regime and low listing costs. These characteristics are the main reasons that many firms have left the main market and joined the AIM (Vismara and Paleari, 2012, Jenkinson and Ramadorai, 2013). In detail, Vismara and Paleari (2012) report that the number of firms that migrated from the main market to the AIM is higher than the number of firms that migrated from the AIM to the main market. In particular, they find that 282 firms left the main market for the AIM, whereas only 90 firms moved from the AIM to the main market, between 1995 and 2009. Similarly, Jenkinson and Ramadorai (2013) find that 267 firms moved to the AIM, whereas only 73 firms switched to the main market, in the period from 1995 to 2006. In this regard, Campbell and Tabner (2014, p. 3) argue that "more than twice as many firms transfer from the main market to the AIM as transfer in the other direction. It is unusual to see such a high number of firms seeking to migrate from a more regulated exchange to a less regulated exchange within the same jurisdiction".

The attractiveness of the AIM can also be seen through the higher number of its admissions over time compared to the main market (Doukas and Hoque, 2016). According to the LSE, the number of admissions to the AIM to that of the main market is, for example, 102:59 firms in 2010, 90:41 firms in 2011, and 71:27 firms in 2012, to mention just a few.[15] Regarding other market characteristics of the AIM in relation to the main market, Board et al. (2015) and Litvintsev (2009) indicate that the AIM is generally younger, less diversified, riskier (i.e. higher volatility) and less liquid (i.e. with less trading volume) compared to the main market.

2.4 The Regulation and Disclosure of the AIM

The AIM is characterised by having a more flexible and lenient regulation system, with low disclosure requirements. In particular, AIM firms have "no minimum market capitalization, no trading record requirement, no prescribed level of shares to be in public hands, no prior shareholder approval for most transactions, admission documents not pre-vetted by the Exchange nor by the UKLA [UK Listing Authority] in most circumstances" (LSE, 2010b, p. 6). Besides this, although the minimum percentage of free float is 25% for firms listed in the main market, no minimum percentage is imposed for AIM firms (Doukas and Hoque, 2016).

[15] See historical Main Market Factsheets: https://www.londonstockexchange.com/statistics/historic/main-market/main-market.htm and AIM Statistics: https://www.londonstockexchange.com/statistics/historic/aim/aim.htm

The AIM is considered an exchange-regulated market, and it is not directed by the Financial Conduct Authority (FCA). However, it is supervised by the LSE (Khurshed et al., 2016).

Regarding disclosure requirements, the AIM has lower disclosure requirements compared to other major stock markets (Espenlaub et al., 2012). For instance, firms in the main market of the UK must comply with strict requirements that are mentioned in the "Listing, Disclosure, and Transparency Rules". Nonetheless, those directives are not imposed on AIM firms (Vismara and Paleari, 2012). The nature of disclosure of financial information for the AIM is therefore less prescriptive and demanding compared to the main market (Doukas and Hoque, 2016). The AIM has three legislations: AIM Rules for Companies, AIM Rules for Nominated Advisers and AIM Disciplinary Procedures.

Specifically, the AIM Rules for Companies provide the rules and responsibilities with which AIM firms are obligated to comply. For instance, an AIM firm must disclose any changes in its sphere of activity, financial condition, business performance, fundamental transactions, related party transactions, price sensitive information,[16] acquisitions, significant shareholders,[17] appointment or dismissal of any director, appointment or dismissal of any broker or changes to its NOMAD, website address, registered office address, accounting reference date or legal name, and in case of cancellation (LSE, 2016).

In August 2006, a new rule (which has become mandatory since 2007) was added to the AIM Rules, called "Rule 26". It states that a firm listed on the AIM has to have a corporate website that contains at least certain required information. This information includes the activity of the firm, information about its managers and directors, the responsibilities of the board of directors and board committees, the firm's country of operation and incorporation, the articles of association, admission documents, the rights of shareholders statement, the number of shares in issue, the percentage of shares not in public hands, the percentage of shares held by significant shareholders and their identities, annual and half-yearly reports for at least three years, annual general meetings (AGMs), a corporate governance statement[18] and details of its NOMAD (LSE, 2016). Notably, Rule 26 also requires firms to disclose inside information

[16] An AIM firm should issue notification to the public of any developments which could lead to a significant movement in its share price. These developments can be related to the firm's financial condition, the activity of the firm, or the performance or expected performance of the firm.
[17] Any investor that holds 3% or more of the firm's shares.
[18] This statement should describe in detail the corporate governance code that the firm has decided to comply with and how the firm complies with the code; otherwise the firm should explain why it has not applied the code.

under the Market Abuse Regulation (MAR).[19] It aims to ensure investor protection and market integrity by preventing insider dealing, unlawful behaviour and market manipulation.

Overall, the trading of AIM firms can be suspended from the market if it is not conducted in an orderly manner, investors' protection is lost, the reputation and integrity of the firms have been impaired, or firms have failed to comply with the AIM Rules for Companies. In case firms desire to be delisted from the AIM, it is required that at least 75% of the shareholders vote to approve and agree on the cancellation (LSE, 2016).

2.5 The Corporate Governance of Firms Listed on the AIM

As this thesis focuses on corporate governance of firms listed on the AIM, it is important to provide information regarding this aspect. The adoption of a corporate governance code for AIM firms is voluntary, and therefore it is subject to the concept of either "comply or explain". In this regard, AIM firms must report their "comply or explain" choices and/or justifications on their websites (LSE, 2016). Statistically, Snell and O'Brien (2008) indicate that only 3% of firms listed on the FTSE AIM 100 Index comply with the whole UK Corporate Governance Code.

Although the Code is voluntary, AIM firms are keen to have good corporate governance that is most appropriate to their sizes, needs, structures and natures. For instance, IXICO plc, a listed firm of the AIM, states in its annual report that "we do not comply with the UK Corporate Governance Code ('the Code') however we draw upon best practice available, including those aspects of the Code we consider to be relevant to the company and best practice given the Group's size and stage of development" (IXICO plc, 2014, p. 7).

In practice, instead of "the Code", the vast majority of AIM firms prefer to comply with the Quoted Companies Alliance (QCA).[20] Some examples are provided below regarding compliance with the QCA by AIM firms:

> *The Company complies with the Corporate Governance Code for Small and Mid-sized Quoted Companies issued by the Quoted Companies Alliance in such respects that are*

[19] From 03 January 2018, AIM firms have to keep and post on their websites all inside information for at least five years. For more details, see AIM rules for Companies, 2018.

[20] The Quoted Companies Alliance (QCA) indicates that 89% of AIM firms follow the QCA Corporate Governance Code, 6% follow the UK Corporate Governance Code, and 5% follow different types of codes, such as territory or country code. See: https://www.theqca.com/news/briefs/175536/whichcorporate-governance-codes-do-aim-companies-apply-.thtml

appropriate for a company of its size, nature and stage of development (Synety Group plc, annual report 2014, p. 18).

ECR is committed to high standards of corporate governance and the Board complies with such provisions of the Corporate Governance Code for Small and Mid-size Quoted Companies 2013 issued by the Quoted Companies Alliance as are commensurate with the size of the Group, the nature of its activities and its stage of development (ECR Minerals plc, annual report 2016, p. 10).

The UK Corporate Governance Code is not mandatory for companies traded on the AIM Market. However, the Board of The Fulham Shore PLC recognises the importance of sound corporate governance. The Group intends to comply with the QCA Guidelines so far as is practicable and appropriate for a public Group of its size and nature (The Fulham Shore plc, annual report 2015, p. 9).

As noted by Mallin and Ow-Yong (2012), the QCA Code works on matters that influence small and growing firms, particularly for those listed on the AIM. In other words, the main target of the QCA Code is to benefit the sectors of small and growing firms with regard to their practices of corporate governance (Campbell and Tabner, 2014).

Technically, the guidelines of the QCA are established based on the UK Corporate Governance Code, yet they are less detailed and prescriptive, as they are designed to be flexibly suitable to the natures, needs and structures of small corporations. For instance, the QCA recommends the board of directors contain at least two independent non-executive directors, whereas the UK Combined Code recommends that the board maintain a balance between executive and non-executive directors; that is, the board should contain 50% independent non-executive directors (Campbell and Tabner, 2014).

Importantly, the QCA Code identifies 12 key principles of corporate governance. Each firm must identify the principles they are complying with and provide justifications for their choices. These should be explained in the statement of corporate governance either on the firm's website or in its annual report. In practice, AIM firms should seek advice from their NOMADs about their compliance with the QCA Corporate Governance Code. The role of NOMADs in the AIM will be discussed in the subsequent section (Section 2.5).

In this thesis, corporate governance quality (one of the main investigated constructs) is determined and quantified based primarily on the guidelines of the QCA Code due to two reasons: (1) practical support from the LSE (LSE, 2010c, p. 1), and (2) it is suitable for application to AIM firms because the QCA Code is "specifically tailored to the needs of growth companies and their investors" (Cronin et al., 2012, p. 4). According to the Quoted Companies Alliance, 12 principles of corporate governance should be taken into consideration by small and growing firms. The 12 principles are shown in Table 2.1.

Table 2. 1 Key Principles of Corporate Governance

#	Principle	Minimum Disclosure	Illustration
1	Setting out the strategy and vision of the firm	Summary of the strategy and vision of the firm.	A clear articulation of the firm's strategy should be designed.
2	Managing and communicating risk and implementing internal control	Audit committee report. Remuneration committee report. Risk management and internal control.	The report of the audit committee should explain the major tasks of both external auditors and management. This should include issues related to financial statements and the independence and objectivity of auditors. Also, the audit committee should focus on risks. The report of the remuneration committee should illustrate how remuneration policy and the firm's practices stand with the strategy of the firm. A summary of both internal control and risk-management systems should be provided, as well as uncertainties which may face the firm.
3	Corporate communication and shareholder relations	Results of shareholder voting in the annual general meeting (AGM). Communication with shareholders.	The results of shareholder voting, whether by show of hands or poll, should be reported after the meeting on the firm's website. There should be a reporting framework and communication between the board of directors and shareholders. The interests of the board should not conflict with the interests of shareholders.
4	Meeting the objectives and needs of shareholders	Description of roles. Non-executive appointment terms. Published material.	A description of the responsibilities and roles of the chairman, the senior independent director and the chief executive should be provided. The conditions of appointment of non-executive directors should be stated. The annual report, as well as any governance material, should be posted on the firm's website and should include notices of meetings for the last three years.
5	Social responsibilities and meeting stakeholders	Risk management and internal control.	Summary of the risk-management systems and internal control. A description should be provided on how risks can be linked with performance, strategy, remuneration policy and corporate responsibility.

6	Using cost-effective and value-added arrangements	Risk management and internal control.	Adopting good corporate governance involves a direct cost. Thus, it is important to have effective arrangements of proportionate governance. A clear understanding between shareholders and the board about how the firm prevents abuses and improves value through good corporate governance.
7	Developing processes and structures	Chairman's governance report. Attendance and meetings records.	The annual report should include a chairman's report. The chairman's report should explain how the QCA Code is employed and how the Code supports the success and strategy of the firm. Disclosure of the number of meetings during the year of the board of committees, as well as attendance records of each director.
8	Responsibility and accountability	Chairman's governance report. Description of roles. Matters reserved for the board.	The chairman is responsible for the corporate governance of the firm. The board in turn has a legal obligation and joint responsibility to assist the success of the firm in the long term. A list of the types of decisions reserved for the board.
9	Balance on the board	Details of Directors. Independent directors.	Disclosure of the identity, roles and committee memberships of all firm directors. The chairman and the CEO have different roles. The board should not be controlled by a group of people or one person. The board must not be too large and must not be too small. Independent directors should be identified, as well as the reasons for their independence. At least two independent non-executive directors.
10	Capabilities and skills of the board	Relevant experience and skills. Board committees. Terms of reference: audit committee, remuneration committee and nomination committee.	There should be a description of the relevant experience and skills for the board of directors (both executive and non-executive directors). The performance of board members should be regularly reviewed; therefore, inefficient members should be replaced or assisted to be more effective. A brief description of the accountability, responsibilities and roles of each board committee in the firm. The terms of reference of audit, remuneration and nomination committees should be included in the annual report. In case a firm does not have a nomination committee, the entire board should determine senior appointment matters and nomination.

11	Evaluating the development and performance of the board	Performance evaluation. Role of internal and external auditors.	A description of the performance for each member of the board, the board as a whole and each committee. Also, a summary description of performance compared with prior years should be provided. An explanation of the role of the external advisers to the board or the committees of the board, as well as the responsibilities of the internal advisory (e.g. the roles performed by the senior independent director and company secretary in supporting the chairman). Also, non-executive directors can have access to external advice.
12	Providing support and information	Information summary.	A summary of information received by the committees' members and the board of directors.

Source: the QCA: Corporate Governance Code for Small and Mid-Size Quoted Companies, 2013.

2.6 The Nominated Advisers (NOMADs) of the AIM

In the regulatory system of the AIM, the NOMAD is considered the central structural feature since it plays an important role in the process of admission, evaluating a firm's overall suitability and appropriateness for the market, and assisting the firm throughout its flotation process (Mallin and Ow-Yong, 2012). In this regard, the AIM Rules for Nominated Advisers state that, "a nominated adviser is responsible to the Exchange for assessing the appropriateness of an applicant for AIM, or an existing AIM company when appointed its nominated adviser, and for advising and guiding an AIM company on its responsibilities under the AIM Rules for Companies" (LSE, 2018, p. 2). AIM firms must have a NOMAD throughout their existence on the market (Khurshed et al., 2016). Failure to retain a NOMAD will lead to the firm's trading being directly suspended. The continuation of a firm for one month without a NOMAD will lead to the cancellation of the firm's listing (LSE, 2016).

NOMADs are private regulators that supervise AIM firms and are responsible for their quality. In this regard, the AIM can be seen as a "reputational market" since shareholders depend on the NOMAD as a representative of the quality of firms listed on the AIM (Mendoza, 2008). The presence of this private regulator can help to reduce regulatory barriers and therefore attract firms to enter the AIM (Stringham and Chen, 2012).

According to the AIM Rules for Nominated Advisers, a NOMAD can supervise a firm if the four following criteria are met[21]. It (1) must be a firm, not an individual, (2) must possess experience in corporate finance within the last two years, (3) must have carried out at least three transactions within the last two years and (4) must employ a minimum of four qualified executives. However, even when the four criteria for becoming a NOMAD are achieved, the Exchange has the right to reject the application if the applicant's participation may dampen the integrity and reputation of the AIM (LSE, 2018).[22]

The NOMAD must be independent, with no relationship with the firms it represents, and must have no conflicts of interest between the firm and any other parties. The NOMAD must not be a substantial ownership (i.e. have more than a 10% shareholding) of the firms it represents.

[21] An example of a nominated adviser on the AIM is finnCap Ltd. It is supervised 88 AIM firms. For more information about the nominated advisers: https://www.londonstockexchange.com/exchange/companies-and-advisors/aim/for-companies/nomad-search.html

[22] The Exchange checks the reputation of the NOMAD, as well as checking whether the NOMAD has been subject to disciplinary action by any financial or legal authority.

Furthermore, the NOMAD should ensure that the directors, consultants and key managers of firms possess enough experience and skills to be leaders of a UK public firm, as well as investigating the efficiency of the board of directors, their identities and profiles. Besides this, the NOMAD should also have the capability to advise the directors of the firm regarding their responsibilities under the AIM Rules for Companies (LSE, 2018).

Primarily, the NOMAD should take into consideration the requirement that AIM firms have sufficient knowledge to understand and comply with the AIM Rules for Companies. The NOMAD should take into account the adoption of appropriate practices of corporate governance for the firms it represents, i.e. the determination of a suitable code for the firms with which the firms can comply; otherwise, a firm should explain why it is not complying with a code. If a firm decides to change a member of its board of directors, it should take advice from the NOMAD. In this case, the NOMAD can make sure that the new member of the board of directors is a suitable candidate (LSE, 2018).

In addition to the advisory role played by the NOMAD, the regulator should monitor the trading activities of the firm by employing appropriate alerts for considerable movements of share prices or movements in trading where a timely course of action can be taken (LSE, 2018).

In addition to the NOMAD, AIM firms must have a broker throughout their existence on the market, where the broker should be a member of the LSE. In this regard, the LSE states that, “An AIM company must retain a broker at all times” (LSE, 2016, p. 14). The roles of both NOMAD and broker can be performed by the same adviser. Nevertheless, even when the two parties have the same identity, their roles and responsibilities are totally different. Whilst the NOMAD is mainly responsible for evaluating a firm's overall suitability and appropriateness for the market, assisting the firm throughout its flotation process and advising the firm regarding its compliance and obligations with the AIM Rules, the broker is mainly responsible for providing the firm with research on potential investments, assisting in promoting the firm to potential investors, forming good relationships with investors, providing information about trading issues and relevant markets and arranging fundraising activity for the firm (Khurshed et al., 2016).

2.7 Ownership Structure of the AIM

Unlike the main market of the UK, the literature on the ownership structure of AIM firms is relatively limited. Although the AIM has the same jurisdiction as the main market, it can be argued that the composition of ownership structure of firms listed on the AIM may be different from the main market for three reasons: (1) the nature and size of participating firms; (2) differences in corporate governance guidelines, and (3) differences in regulation regimes. Regarding the first, Kini and Mian (1995) indicate that ownership structure may be different across the size of firms. They find that small firms tend to have smaller institutional ownership compared to large firms. In line with this, Iskandrani et al. (2015) argue that small firms tend to have small shareholder bases. Therefore, the level of ownership concentration would be higher than in large firms. Hence, the probability of trading based on private information increases, since the impacts of concentrated ownership may be stronger for small firms.

Secondly, firms listed on the main market must take into consideration the required disclosure and the guidelines of the UK Corporate Governance Code; in contrast, firms listed on the AIM are not required to prepare their governance based on the same code. Instead, AIM firms are encouraged to follow the guidelines of the QCA Corporate Governance Code (Cronin et al., 2012). Since the QCA Code is less detailed, prescriptive and demanding than the UK Corporate Governance Code, investor protections may be lower on the AIM than on the main market. Supporting this, Mortazian et al. (2018) indicate that the AIM has lower investor protection and higher ownership concentration compared to the main market. This in turn can affect the role of minority shareholders in the AIM, since high monitoring-by-ownership concentration is expected.

The third reason is related to the light regulation of the AIM compared to the main market. For instance, for firms to be listed on the FTSE UK Index Series, the minimum percentage of free float shares for UK-incorporated firms is 25%, and for non-UK-incorporated firms the figure must be greater than 50% (FTSE, 2019, p. 14). Nevertheless, since the AIM is characterised by having a more flexible and lenient regulation system, the levels of free float for AIM firms are up for discussion with the nominated adviser; i.e. there is no limited/minimum percentage for the free float on the market (LSE, 2015b). In this regard, Ding et al. (2016) argue that the reason for setting a minimum percentage of the free float shares for firms listed on the main market is to reduce the concerns of excessive control of large ownership on firms and to protect the minority shareholders.

The three arguments mentioned above lead us to conclude that the composition of ownership levels and concentration, as well as the investor protection of the AIM, may be different from the main market. In brief, the AIM may have lower investor protection and higher ownership concentration (Mortazian et al., 2018) than the main market, where both investor protection and the level of ownership dispersion are high (Mortazian et al., 2018, Franks and Mayer, 2017, Porta et al., 1999). Thus, the three arguments can provide more motivation to investigate the role of ownership structure on the AIM.

Supporting the differences in ownership structure between the AIM and main market, the Office for National Statistics states that, "AIM companies had different patterns of ownership to main market companies" (ONS, 2015, p. 23). Besides this, Arcot et al. (2007) indicate that institutional investors are the largest ownership group in the AIM. They mention that approximately 50% of the AIM's floating shares are allocated to institutional ownership rather than to the public. Also, they indicate that about 25% of AIM firms are owned by active retail investors, whereas the rest of the shares are owned by families, firms' employees and managers. These retail investors are the most active shareholders, and play an important role in sustaining the liquidity of the AIM.

Regarding the institutional ownership, Ali (2012) argues that institutional investors mainly control the investments of the AIM.[23] This is an advantage for firms, since these institutions are mostly long-term investors, who provide firms with relatively sustainable finance. Apart from this, Arcot et al. (2007) argue that institutional ownership is more appropriate for the AIM, since these institutions are considered knowledgeable and experienced investors. Moreover, since institutional investors held about 50% of the AIM's floating shares in 2005 and 2006, it can be argued that AIM firms tend to exhibit concentrated ownership.

Additionally, Table 2.2 indicates the holdings of FTSE 100 and the AIM in 2014 and 2016. According to the Office for National Statistics, foreign shareholders represent the largest ownership group in the AIM. They held 45% and 42.8% of AIM shares in 2014 and 2016 respectively. Compared to the FTSE 100, the holdings of foreign ownership were 55.2% and 56% in 2014 and 2016 respectively. The second largest ownership identity in the AIM is individual investors. They held 30.6% and 29.7% in 2014 and 2016 respectively, whereas

[23] *Growth Company Investor*, which covers the AIM and small cap firms listed in the UK, stated that institutional ownership controlled 35.2% in 2003, whereas this percentage rose to 56.7% in August 2006. See (Arcot et al., 2007, p. 42).

individual investors held only 9.5% in the same period on the FTSE 100. Consequently, the Office for National Statistics states that, "individuals owned a larger share of Alternative Investment Market (AIM) companies than those on the main market" (ONS, 2015, p. 21).[24] Unit trusts form the third largest ownership identity in the AIM, with a proportion of 10.6% and 11.3% of AIM shares in 2014 and 2016 respectively. Comparatively, this identity held 8.6% and 9.1% of the FTSE 100 in the same years. The rest of the ownership identities are outlined in Table 2.2. How these ownership identities affect stock liquidity will be discussed in detail in the next chapter.

[24] In the literature, individual investors are sometimes referred to as noise traders (e.g., Kholdy and Sohrabian, 2014) or uninformed liquidity traders (e.g., Greene and Smart, 1999). While market makers lose when they trade against informed traders, they recoup their losses when they trade with noise traders (Greene and Smart, 1999). These traders usually have no access to private or inside information. Thus, they "irrationally act on noise as if it were information that would give them an edge" (Long et al., 1990, p. 704). Although their trading causes the market to be inefficient and impacts the share price, they play an important role in enhancing stock liquidity through their frequent trades (Black, 1986). Previous theoretical studies also indicate that the more noise traders there are, the less adverse selection problems exist for the market makers, i.e. tighter spread and more depth, which causes improved stock liquidity (Kyle, 1985, Glosten and Milgrom, 1985, Admati and Pfleiderer, 1988).

Table 2. 2 Holdings of FTSE 100 and the AIM in 2014, 2016 and 2018[25]

	FTSE 100 (2014)	AIM (2014)	FTSE 100 (2016)	AIM (2016)	FTSE 100 (2018)	AIM (2018)
Rest of the world (Foreign)	55.2	45.0	56.0	42.8	57.1	48.2
Individuals	9.5	30.6	9.5	29.7	11.3	25.1
Unit trusts	8.6	10.6	9.1	11.3	9.6	10.9
Other financial institutions	7.2	4.6	8.1	8.3	8.2	7.3
Insurance companies	5.9	2.3	5.0	1.8	4.1	1.3
Pension funds	3.0	2.7	3.0	2.8	2.4	3.7
Public sector (government)	3.6	0.0	1.5	0.0	1.2	0.2
Private non-financial companies	2.3	0.9	2.6	0.2	2.3	0.6
Investment trusts	1.9	1.5	2.0	2.4	1.2	1.4
Banks	1.5	1.6	2.0	0.4	2.0	0.7
Charities, churches, etc.	1.3	0.3	1.1	0.4	0.5	0.6
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Office for National Statistics (2014, 2016 and 2018).

[25] The FTSE 100 includes the largest 100 firms listed on the LSE, whereas the AIM includes small and growing firms. The market capitalisation of the FTSE 100 in 2014 and 2016 was £6,566.09 and £7,142.83 respectively, while the market values of the AIM for all shares in 2014 and 2016 were £702.00 and £844.41 respectively.

With regard to the disclosure requirements of large shareholders on the AIM, the AIM Rules for Companies suggest two types of control ownership that are required to disclose their holdings. The first ownership is called "significant shareholder" which refers to any person (identity) that holds 3% or more of a firm's shares. The second ownership is called "substantial shareholder" and is defined as any person (identity) that holds 10% or more of a firm's shares (LSE, 2016, p. 32). Following the classification of large shareholders by AIM Rules for Companies into significant shareholder and substantial shareholder, the study employs them as proxies for ownership concentration.

2.8 Summary

This chapter has provided basic information and background on the main market being studied in this thesis, i.e. the Alternative Investment Market (AIM). It aims to provide readers with a fundamental understanding about the market's characteristics, corporate governance environment and ownership structure. Overall, the AIM is a sub-market of the LSE which was founded in June 1995, and was established to accommodate small and growing firms. It is considered the most successful growth market in the world. The success of the AIM can be attributed to the low costs and requirements for listing, the lenient regulations and disclosure requirements, the voluntary adoption of a corporate governance code, the benefit of the AIM's location in London, and the market's reputation. These features of the AIM attract a high number of international firms to join the market. As a result, the AIM is considered a worthy investment pool for foreign capital.

Each AIM firm must have a NOMAD during its survival and trading. The NOMAD is considered the central structural feature of the AIM, where they are responsible for evaluating firms' overall suitability and appropriateness for the AIM and helping firms throughout their time on the listing. The NOMAD should take into consideration the directors' supervisory role in emphasising the firm's ability in complying with the three AIM legislations: (1) AIM Rules for Companies; (2) AIM Rules for Nominated Advisers, and (3) AIM Disciplinary Procedures. The NOMADs are also responsible for assisting firms' boards of directors to determine the corporate governance code that is most appropriate for the firms' natures, needs, sizes and structures.

Finally, the composition of ownership structure and investor protection for the AIM are generally different from the main market, with the AIM tending to have lower investor protection and higher ownership concentration. This in turn can potentially lead to a high monitoring-by-ownership concentration, which can affect the minority shareholders rights in AIM firms. The information provided in this chapter about the AIM can help readers to understand the thesis better and more easily when proceeding to the main empirical chapters. Subsequently, the next chapter will discuss the theoretical framework and its application to the relationship between corporate governance quality, ownership structure, ownership identity and stock liquidity.

Chapter 3 Literature Review

3.1 Introduction

The aims of this chapter are twofold. First, the relevant theoretical framework will be introduced and discussed. Subsequently, a thorough review of the literature relating to the relationship between corporate governance quality, ownership structure and stock liquidity will be provided. To start with, the theoretical framework section will primarily focus on the discussion of agency theory and its applications on corporate governance, ownership structure and stock liquidity. Previous studies have suggested the importance and relevance of agency theory for researchers in these two corporate aspects (Fama and Jensen, 1983b, Jensen and Meckling, 1976, Eisenhardt, 1989). The notion of agency theory refers to conflicts of interest between firms' managers and shareholders (Jensen and Meckling, 1976, Shleifer and Vishny, 1997). Hence, corporate governance mechanisms and ownership structures are widely recommended as potential resolutions to mitigate those agency conflicts (Shleifer and Vishny, 1997, Denis, 2001). In addition to the comprehensive discussion of agency theory, the chapter also briefly introduces two other related theories, namely stakeholder theory and stewardship theory, which generally exhibit a number of critical views of agency theory. In brief, stewardship theory does not conform with the idea of agency conflicts between managers and shareholders (Davis et al., 1997, Donaldson and Davis, 1991, Donaldson and Davis, 1994), whilst stakeholder theory mainly criticises the narrow focus of agency theory, i.e. only managers and shareholders (Freeman, 1984).

Following the theoretical framework discussion, the subsequent section will provide and discuss an extensive body of the literature which empirically studies the areas of corporate governance, ownership structure, ownership identity and stock liquidity. This literature review section provides readers with a comprehensive view on the scope of academic research thus far on the investigation topic of this thesis. Based on this, the contributions of this thesis are highlighted and appropriate hypothesis development can be elicited.

3.2 Theoretical Framework

This section focuses on fundamental theories as the foundation of investigated topics in this thesis. These include agency theory, stakeholder theory and stewardship theory. To begin with, a general understanding of these theories will be introduced, followed by their theoretical

applications to the relationship between corporate governance quality, ownership structure and stock liquidity.

3.2.1 Agency Theory

Agency theory is considered one of the most important, popular and dominant theories in the literature of finance and economics in recent decades. The theory was developed as principals authorised agents to implement some duties and make decisions on their behalf (Jensen and Meckling, 1976, Ross, 1973). Under a key assumption, namely that individuals tend to make decisions for their own advantage and well-being (self-interest), conflicts between the principals and the agents occur (Eisenhardt, 1989).

The literature of finance suggests that there are two types of agency problems: Type I, the principal–agent relationship, and Type II, the principal– principal relationship. It has been argued by Berle and Means (1932) that "the separation of ownership from control" is the main cause of the Type I agency problem. Basically, owners of firms tend to not get involved with the firm's operations, especially in the case of large firms. Instead, virtually all the important decision-making processes are made by the managerial teams (managers). As the owners and managers of the firms are different individuals with different goals and interests, pursuing managers' interests dampens or damages owners' interests (Jensen and Meckling, 1976). Therefore, conflicts may occur as managers of firms with designated authorisation from principals do not behave and act in shareholders' interests (Hill and Jones, 1992, Jensen and Meckling, 1976). In practice, it is challenging for the owners to consistently oversee and enforce the managers to ensure they put aside their self-interests and behave in a way that can maximise the owners' wealth.

Eisenhardt (1989) mentions two main causes of the Type I agency relationship. Firstly, agency problems can occur when the goals or desires of shareholders and managers conflict, and it is expensive for shareholders to verify the real actions of managers on the firms. In other words, the shareholders cannot confirm whether their assigned managers' behaviours are appropriate and adhere to the owners' interests. Secondly, agency problems can occur when shareholders and managers exhibit different attitudes towards risk. That is, they might prefer different courses of action due to differences in their risk preferences. Particularly, as suggested in Eisenhardt (1989)'s principal–agent model, the manager is a rent seeker and risk averse, whilst shareholders are profit seekers and risk neutral.

In addition to the causes of agency issues, the model also provides two suggestions to mitigate them. Firstly, if contractual obligations between managers and shareholders are incentive based, it is expected that managers are more likely to act in the favour of shareholders. Secondly, if shareholders possess more information about managers' behaviours whilst monitor managers effectively, it is expected that the managers' actions will be more oriented towards shareholders' interests. Specifically, the conflicts between the two parties may be reduced if a complete contract exists by means of a precise process of determining the ways managers of firms behave and act in different situations (Fama and Jensen, 1983b). However, it is difficult in practice to precisely predict the future issues or events that may influence managers' decisions (Hart, 1988, Williamson, 1984). Given this, it is unfeasible to draw up a "complete" contract which can fully address and state all expected behaviours and actions (under all possible scenarios) that managers should commit to and be responsible for (Grossman and Hart, 1986). Since the managers of firms are considered expert and qualified compared to shareholders, they take the control rights of the firm (Shleifer and Vishny, 1997). Hence, as long as the control rights are in managers' hands, they can become opportunistic and expropriate the wealth of shareholders whenever possible (Grossman and Hart, 1986, Jensen and Meckling, 1976).

Whilst the Type I agency problem focuses on conflicts of interest between managers and shareholders, the Type II agency problem suggests that even different types and classes of shareholders have different interests. Therefore, conflicts can occur among shareholders, particularly between majority shareholders and minority shareholders, of the same firm. This occurs because the majority shareholders hold the majority of the firm's shares. In contrast, the minority shareholders each hold only a small stake in the firm. Given this, the majority shareholders possess higher voting power than the minority, and hence they can make decisions that serve their benefits or interests, which can restrain the interests of the small shareholders (Fama and Jensen, 1983b, Shleifer and Vishny, 1997). This type of agency problem is mostly common in markets, where ownership structures of listed firms are concentrated by a few individuals or institutions, such as family ownership. Holderness (2003) indicates that shareholders of a firm tend to accumulate their ownership for "the shared benefits of control and the private benefits of control". The agency conflicts mainly lie in the latter, as the incentive of ownership concentration is to use the power of voting to consume the resources of the firm or to enjoy the benefits of the firm, which are not shared with small shareholders. Young et al. (2008) state two causes of the Type II agency problem; these are (1) the existence of ownership

concentration with weak mechanisms of corporate governance and (2) the legal system that is unable to protect the rights of the minority shareholders.

3.2.2 Causes of Agency Problem

The literature indicates several potential sources of conflict between firms' managers and shareholders. These include information asymmetry, adverse selection, moral hazards, differences in risk preferences, free cash flow, duration of involvement and decision making.

The literature of corporate governance has extensively debated the problem of **information asymmetry**, since it is considered one of the most important sources of agency conflicts (Hill and Jones, 1992, Fama and Jensen, 1983b). Information asymmetry can be defined as a situation where one party to a transaction has more information about the transaction than the other parties. The managers of a firm are more informed about the firm than shareholders due to their daily engagement in the process, resources, operations and management of the firm (Fama and Jensen, 1983b). The problem of information asymmetry may in turn limit the ability of shareholders to effectively monitor and control managerial actions, as well as their ability to ensure that managers are working in the interests of shareholders (Adams, 1994).

Information asymmetry is the main source of two other problems adverse selection and moral hazard. **Adverse selection** is defined by Eisenhardt (1989) as "the misrepresentation of ability by the agent". It happens as "the principal cannot completely verify these skills or abilities either at the time of hiring or while the agent is working". On the other hand, **moral hazard** is defined as a situation of conflicts that occurs when the managers of firms are less answerable and not striving to achieve the best (Alchian and Demsetz, 1972). Besides this, Eisenhardt (1989) defines moral hazard as lack of effort by managers, with shareholders of firms unable to constantly monitor managers' activities. In this respect, shareholders suffer from their lack of information and inability to control such conflicts in the presence of moral hazard. According to Denis (2001), there are two reasons behind the failures of shareholders to perform effective monitoring. The first reason is that shareholders do not have sufficient industry experience, therefore they might not be able to monitor the manager's activities, whereas the second reason is related to high monitoring cost when shareholders may only possess a small proportion of the firm's equity. In brief, despite the similarities between the two concepts, adverse selection occurs due to the shareholders' lack of true information about the managers

before the authorisation takes place, whilst moral hazard occurs after the managers have been hired.

In addition, **differences in risk preferences** between managers and shareholders are considered another conflicting source in the agency relationship. In detail, the managers mainly care about their own wealth, such as salary, profit-sharing systems, stock options and bonuses. Besides this, the managers of firms are also concerned with not losing their positions and with upholding their reputations. However, a manager's wealth and position in a firm, as well as their reputation in the markets, are mainly dependent on the firm's performance (Amihud and Lev, 1981). That is, the labour market assesses the performances of the firms the managers are currently managing, based upon which their future employment opportunities are determined (Fama, 1980). Consequently, firm managers favour selecting less risky investments (Hirshleifer and Thakor, 1992). This argument adheres to agency theory, where managers tend to be risk averse (Jensen and Meckling, 1976, Fama and Jensen, 1983b).

On the other hand, shareholders in the firm prefer risky investments in order to improve their wealth (Jensen and Meckling, 1976, Jensen and Murphy, 1990). In this regard, shareholders consider all investments with positive net present values (NPV) to be attractive (Denis, 2001). Nonetheless, managers tend to avoid value-enhancing but risky investments, so as to avoid reduced performances, bankruptcy issues and failures (Wright et al., 1996). Thus, the managers and shareholders of a firm might have different behaviours towards risk, since they have different interests.

Moreover, the availability of **free cash flow** in the firm can lead to conflicts between managers and shareholders. Jensen (1986) argues that since all positive NPV investments are already financed and invested,[26] shareholders prefer to obtain the free cash flow whether in the form of stock repurchase or dividends. Nevertheless, managers may prefer to either retain the free cash flow or invest it, even in projects that have negative NPV. The reason is that more investments can lead to a rise in the size of the firm in terms of growth in assets, at least in the short term, which makes the manager look more prestigious and powerful in the eyes of outsiders (Jensen, 1986).

[26] Jensen (1986) mentions that free cash flow is defined as excess in cash flow after funding all investments that have positive net present values.

Finally, the **duration of involvement** of managers in firms can be a source of conflict in the agency relationship. That is, when managers and shareholders engage in a short-term relationship, it is more likely that shareholders will not be able to capture and understand the managers' behaviour. In contrast, in a long-term relationship, shareholders will learn about the managers and better assess their behaviour (Lambert, 1983). In this regard, Eisenhardt (1989) mentions that the asymmetric information between managers and shareholders is likely to be greater in short-term agency relationships.

3.2.3 Resolutions to Agency Problem

Acknowledging the importance of agency problems on firms' health and survival, studies on resolutions to agency conflicts are still ongoing among academics, researchers and corporates. Previous literature has suggested that both the internal and the external mechanisms of corporate governance can reduce conflicts in agency relationships, whether between agents and principals or among principals themselves. Internal corporate governance mechanisms mainly include the board of directors (e.g. non-executive directors) and the ownership structure (e.g. large shareholders). In contrast, external mechanisms of corporate governance include the rules of stock market development, law, regulation, the legal system and takeovers (Huyghebaert and Wang, 2012, Boubakri et al., 2005, Shleifer and Vishny, 1997). Both the internal and the external mechanisms of corporate governance are essential, since they play important roles in reducing agency conflicts (Shleifer and Vishny, 1997, Denis, 2001).

In this thesis, the focus is primarily fixed on the internal mechanisms of corporate governance. Previous studies have indicated that an effective structure of corporate governance can assist in reducing agency problems through the improvements of information disclosure and transparency in firms (Ali et al., 2017). Besides this, firms which are subject to effective corporate governance are more capable of solving and controlling several agency problems (Mande et al., 2012). In contrast, firms operating in environments that are characterised by weak corporate governance are often exposed to high agency problems (Yuan et al., 2009).

In this regard, Keasey and Wright (1993) emphasise the need for corporate governance to focus on two significant dimensions. The first dimension focuses on the accountability and stewardship of corporate governance, i.e. monitoring and controlling the actions of managers and ensuring that their responsibilities are in the interest of their firm's shareholders. The second dimension focuses on providing managers with suitable incentive schemes to prevent

managerial opportunism. Prior studies have argued that granting the firm managers incentive contracts can align their interests with shareholders. The incentive contracts can be in the form of stock options, share ownership or threat of dismissal (Jensen and Meckling, 1976, Fama, 1980, Shleifer and Vishny, 1997).

Besides this, Eisenhardt (1989) suggests two proposals to reduce agency problems. The first proposal is to contract on the results of the manager's behaviour. Such outcome-based contracting encourages behaviour by aligning the manager's preferences with those of the shareholders. Thus, the actions and behaviours of the managers can be examined. The second proposal refers to higher levels of investment and focus on information systems, such as boards of directors, reporting procedures and budgeting systems. Such information helps shareholders to better capture and monitor managers' behaviours.

Regarding the board of directors as an effective internal mechanism of corporate governance, Fama and Jensen (1983b) describe the important roles of the board of directors in monitoring the opportunistic behaviour of top executive managers. That is, the board of directors has the power to compensate, hire and fire the top-level managers, and to monitor and control important decisions. Such exercises can help to guarantee that the control and decision management are separated. As a result, a more effective board of directors can mitigate the agency problem. According to an extensive body of literature, board of director effectiveness can be enhanced by the board's size, composition, independence level, and internal administrative bodies such as board committees (John and Senbet, 1998).

For instance, independent directors are independent from management (Duchin et al., 2010), selected to work in the interests of shareholders (Rosenstein and Wyatt, 1990), considered the defenders of shareholders against incompetent managers (S.Weisbach, 1988) and willing to stand up to the CEO of the firm in order to protect the interests of shareholders (Duchin et al., 2010). These objectives can be achieved by supervising manager actions, vetoing poor decisions and providing advice (S.Weisbach, 1988). Thus, these directors are considered a vital governance mechanism used to monitor firms' managers and provide information to shareholders (Fama and Jensen, 1983b, S.Weisbach, 1988).

Besides this, the literature argues that CEO duality is considered a source of conflict in the agency relationship, because this can lead power to be concentrated in one person's hands. This issue can limit the monitoring ability of the board and therefore lead to a high agency problems

(Mallette and Fowler, 1992). However, separating the position of the CEO from that of the chairman can enhance the independence of the board, reducing both the opportunistic behaviour of managers (Haniffa and Cooke, 2002) and agency problems (Jensen, 1993).

Another example of the internal mechanism of corporate governance is the board committees. Klein (1998) argues that both audit and compensation committees have primary roles in monitoring managers and releasing information to shareholders. Specifically, the main function of the audit committee is to meet systematically with both internal and external auditors of the firm in order to review the internal accounting controls, audit process and financial statements of the firm. This helps to reduce the agency problem between the firm's managers and shareholders by smoothing and facilitating the release of accounting information to shareholders, therefore reducing asymmetric information between outsiders and insiders. Besides this, the compensation committee reviews and determines the amount and nature of compensation for the firm's top managers and directors. It assists in mitigating the agency problem between the firm's managers and shareholders by implementing and constructing bonus and incentive schemes for top managers. These incentive schemes can prevent managerial opportunism and lead the managers to work for the interests of shareholders, thus aligning the interests of the two parties.

The literature also points out the effective roles of large shareholders as an important mechanism in monitoring firm managers and therefore reducing agency problems. For instance, large shareholders, institutional investors or pension funds are regarded as professional investors as a result of their knowledge in evaluating corporate performance. Hence, their monitoring costs are lower than those of small shareholders (less skilled investors). Therefore, the presence of large shareholders can increase the probability of monitoring, which possibly will help to enhance firm value and reduce agency costs (Byrd et al., 1998). In the same manner, blockholders can reduce self-interested behaviour on the part of managers and therefore enhance firm value (Shleifer and Vishny, 1997), as well as decreasing managerial consumption of perquisites (John and Senbet, 1998). In this regard, Ginglinger and Hamon (2012, p. 63) indicate that, "Blockholders have an incentive to produce information about the firm and to monitor managers, thus reducing rent-seeking managerial". Bhide (1993) also states that active shareholders, such as concentrated ownership, monitor a firm's management and, hence, reduce agency costs.

Some previous studies have suggested some solutions to the problems of information asymmetry in particular. Healy and Palepu (2001) mention that regulations that oblige managers to disclose particular information and which activate the roles of intermediaries (for example, financial analysts) can foster the facilitation of information clarity and transparency between managers and shareholders, and hence mitigate information asymmetry.

3.2.4 Agency Costs

Section 3.2.3 discussed the mechanisms of corporate governance that may mitigate agency conflicts. Nonetheless, the implementations of those mechanisms are associated with costs, i.e. agency cost (Jensen and Meckling, 1976). Agency costs are defined as the aggregation of monitoring costs (incurred by shareholders), bonding costs (incurred by managers) and residual loss (Jensen and Meckling, 1976).

With regard to monitoring costs, shareholders need to bear the cost of monitoring activities designed to reduce the unusual activities of managers, such as constraints on budget and incentive policies (Jensen and Meckling, 1976), and the use of external auditing (Adams, 1994). The cost therefore refers to the efforts and actions that the shareholders take to control management behaviours. On the other hand, bonding cost is carried by managers. In particular, the managers of firms may wish to provide shareholders with evidence of their accountability as well as showing shareholders that they are working in their interests. However, those bonding attempts involve costs that are not necessarily financial – for instance, the provision of extra information on the structures and policies of firms to shareholders (Jensen and Meckling, 1976), or incurred managerial expenses on internal auditors, non-executive directors and audit committees (Watts, 1988).

The third type of agency cost is residual loss. Although the monitoring and bonding costs are tolerated in order to align shareholders' interests with manager's interests, it is hard to reach full agreement or alignment between the two parties, and therefore a loss is incurred as a result of the remaining differences in interest between managers and shareholders (Jensen and Meckling, 1976). In other words, the total execution costs of contract exceed the benefits. Fama and Jensen (1983a) argue that in the case of incomplete contracts, decisions by managers may not be in line with shareholders' interests, hence residual loss remains at the shareholders' expense.

Despite the popularity and importance of agency theory, some studies have criticised the theory regarding its assumptions that firm managers are self-interested and opportunistic. Specifically, some studies mention that humans in general are noble and therefore managers always work ethically for the interest of their firms (Donaldson and Davis, 1991). This argument has become a distinctive theory in the literature of finance, known as stewardship theory (Donaldson, 1990). Another criticism of agency theory is that it has only focused on two components of firms – managers and shareholders – and ignores the important role played by other stakeholders of firms. Freeman (1984) in the first notable publication on stakeholder theory, emphasises that a firm manager needs to balance interests and benefits among all stakeholders. Both stewardship and stakeholder theory will be discussed in the following sections.

3.2.5 Stakeholder Theory

Extending agency theory, which concentrates mainly on the relationship between firm managers and shareholders, stakeholder theory widens its focus on the relationship between firm managers and all firm stakeholders, including customers, suppliers, communities, employees, individuals, lenders and shareholders. Stakeholder theory is also referred to as the exchange relationship by some authors, such as (Freeman, 1984, Hill and Jones, 1992). The exchange relationship indicates that stakeholders have significant impacts on firms – for example, shareholders and creditors provide firms with funds, and employees and managers of the firms provide expertise, experience, knowledge and time, whereas suppliers provide firms with required raw materials for operations. Thus each stakeholder plays an important part in the firm with regards to the contractual relationship (Solomon and Solomon, 2004). The theory was developed by Freeman (1984), who emphasises that managers' attentions should move from working in the shareholders' interests exclusively to working in the interests of all stakeholders of firms (Ayuso et al., 2011). The key assumption of stakeholder theory is that the health and survival of a firm is dependent on the ability of managers to achieve and balance the interests of all stakeholders (Hill and Jones, 1992). Therefore, it is clear that stakeholder theory partially confirms agency theory in terms of achieving the firm's goal, which is the maximisation of the shareholders' wealth. In addition to this, it takes into further consideration the idea of maximising other stakeholders' wealth (Hill and Jones, 1992).

3.2.6 Stewardship Theory

In contrast to agency theory, the key assumption of stewardship theory is that firm managers are professional and ethical agents who aim to work in the interests of shareholders (Davis et al., 1997, Donaldson and Davis, 1991, Donaldson and Davis, 1994). In other words, stewardship theorists assume that managers place higher value on a firm's interests than on self-serving behaviours. Therefore, whilst agency theory concentrates mainly on how the managers should be controlled and monitored in order to serve the interests of shareholders (Jensen and Meckling, 1976), stewardship theory gives the firm managers the independence and power to serve those interests do so (Donaldson and Davis, 1994).

As mentioned above, agency theory focuses on reducing conflicts between managers and shareholders. In contrast, stewardship theory assumes that the behaviours of managers are motivated by intrinsic rather than extrinsic incentives. Thus, the mechanisms of corporate structure, as suggested by agency theory, are not needed to motivate firm managers (Davis et al., 1997, Donaldson and Davis, 1991), as the firm managers are reliable and their decisions are always in favour of shareholders' interests (Donaldson and Davis, 1994).

The above sections have debated different important theories in the literature of corporate governance. These include agency theory, stakeholder theory and stewardship theory. Nonetheless, agency theory is considered the most widespread theory in the literature, since it describes the natures of conflicts between firm managers and shareholders (Jensen and Meckling, 1976, Ross, 1973). In line with this, this theory has received great attention in the literature from academic researchers and therefore it dominates the majority of studies of corporate governance (Eisenhardt, 1989, Hill and Jones, 1992, Daily et al., 2003). In particular, this thesis examines the effects of corporate governance quality, ownership structure and ownership identity on stock liquidity in the AIM. Previous sections, particularly Section 3.2.3, have explained the theoretical linkages between agency theory, corporate governance quality and ownership structure. In the subsequent section, a discussion of the theoretical applications of agency theory on stock liquidity will be provided.

3.2.7 Influences of Agency Conflicts on Stock Liquidity

As discussed in Sections 3.2.1 and 3.2.2, the root of agency conflicts is the existence of information asymmetry between parties as a result of separation of ownership from control

(Jensen and Meckling, 1976). Moving the focus to the main topic of this thesis, this section aims at discussing the applications of agency theory, i.e. the influences of agency conflicts on stock liquidity.

As indicated by Diamond (1985), lower information asymmetry is associated with higher stock liquidity. Specifically, a higher level of information disclosure (less information asymmetry) leads to reductions of managers' incentives to acquire private information. This can lead to less heterogeneity among investor beliefs and fewer speculative situations among informed investors, and hence higher stock liquidity. Besides this, Attig et al. (2006) indicate that firms with more agency conflicts between ultimate owners and minority shareholders have more asymmetric information, leading to wider bid–ask spread, i.e. lower stock liquidity. In more detail, firms with large divergences of control from ownership may have more opportunistic behaviours by their ultimate owners. To enhance their opportunities to implement their plans, those owners may attempt to delay and minimise the information disclosure so that other minority shareholders make their decisions based on inadequate information. In this regard, poor information disclosure may worsen the problem of asymmetric information, hence large ownership may trade on private information to obtain the benefits of control. This in turn can lead to an increase in the bid–ask spread and a reduction in stock liquidity (Glosten and Milgrom, 1985).

In line with this, Attig et al. (2006) argue that firms that are characterised by a large divergence of control from ownership may have a weak policy of information disclosure, which results in a reduction in their stock liquidity. In addition, the conflicts between managers and shareholders due to the separation of ownership from control may lead to increased asymmetric information, which may raise the adverse selection costs. When market makers face the problems of adverse selection, they may increase the bid–ask spread, and therefore negatively affect stock liquidity (Foo and Zain, 2010). Besides, Chu et al. (2015) have found that control–ownership separation is adversely associated with stock liquidity, especially for firms with more severe asymmetric information and agency problems.

Overall, as agency conflicts reduce stock liquidity, resolutions for agency problems that aim to narrow down the information gaps between managers and shareholders may help to improve firms' stock liquidity. As discussed in Section 3.2.3, a popular remedy was suggested by Eisenhardt (1989), and targets the improvement of firms' information systems through effective corporate governance mechanisms. Another remedy, suggested by Shleifer and

Vishny (1997), involves firm's large shareholders in the monitoring process. This thesis primarily focuses on these two influential channels of stock liquidity.

3.3 Empirical Studies

Whilst the previous section provides theoretical foundations for the corporate governance and ownership structure relationships which are investigated in this thesis, this section aims at providing empirical linkages between each of them with stock liquidity, based on a comprehensive review of the literature. These relationships are those between (1) corporate governance quality and stock liquidity, (2) ownership structure and stock liquidity and (3) ownership identity and stock liquidity.

3.3.1 Empirical Studies on Corporate Governance Quality and Stock Liquidity

As previously mentioned in Section 3.2.7, agency conflicts may reduce firms' stock liquidity (Diamond, 1985, Attig et al., 2006, Chu et al., 2015). Therefore, as effective corporate governance mechanisms are said to reduce agency conflicts, it can be conjectured that corporate governance quality may assist in enhancing stock liquidity. In particular, previous studies have argued that effective corporate governance enhances both the operational and the financial transparency through more effective control and monitoring of managers. This leads to reductions in asymmetric information between managers and shareholders, as well as among different shareholder classes, and hence prevents opportunistic behaviours within corporations. As a result of this reduction in agency conflicts, lower heterogeneity among investor beliefs, as well as fewer speculative situations among informed investors, may be achieved, increasing the firm's stock liquidity (Chung et al., 2010, Ali et al., 2017).

In brief, many different aspects of effective corporate governance have been captured to reduce agency conflicts (reducing information asymmetry through higher financial transparency, higher quality and comprehensiveness of disclosures and better monitoring process, etc.). These include an effective board of directors (Ajinkya et al., 2005, Karamanou and Vafeas, 2005), board committees such as audit and compensation committees (Klein, 1998), external auditors within the audit committee (Chung et al., 2010, Platt and Platt, 2012), chairman independence (Ali et al., 2017, Forker, 1992), independent directors and an independent CEO (Kesner and Johnson, 1990), and a higher number of board meetings (Eisenhardt, 1989, Rutherford and Buchholtz, 2007), to mention just a few.

Given the above, previous empirical studies have suggested that effective corporate governance can enhance stock liquidity (Chung et al., 2010, Ali et al., 2017, Karmani and Ajina, 2012, Lei et al., 2013, Prommin et al., 2014). The topic has recently received increasing attention from academia, particularly after the 2007–2009 financial crisis. Nevertheless, prior studies have mainly addressed the relationship between *external* corporate governance and stock liquidity by exploiting different legal and regulatory environments (Bacidore and Sofianos, 2002, Brockman and Chung, 2003, Chung, 2006), whilst "the empirical relation between *internal* corporate governance and stock market liquidity has not yet been established" (Chung et al. (2010, p. 266).

The study of Chung et al. (2010) is among the first studies to directly discuss the impacts of quality of corporate governance on stock liquidity. The authors conducted their study on the NYSE, AMEX and Nasdaq stock exchanges between 2001 and 2004. They employed bid–ask spread, effective spread, market quality index and price impact ratio as proxies for stock liquidity. As a measure of corporate governance index, they developed their own index by using the Institutional Shareholder Services (ISS), which contains 51 governance standards. In particular, they regard the GIM Index, which was developed by Gompers et al. (2003), as inappropriate for internal corporate governance since it was designed to capture the provisions of firms and law. For their index, they selected 24 governance standards of the ISS, then classified them into six main categories. These are audit, compensation, board, ownership, charter and state. The authors find that effective corporate governance is related to improving stock liquidity, i.e. lower bid–ask spread, small price impact, and lower information asymmetry. They argue that effective corporate governance enhances stock liquidity mainly through the improvements of operational and financial transparency.

In addition, Foo and Zain (2010) examined the effects of two corporate governance mechanisms – independent directors and audit committee – on stock liquidity in the Malaysian stock market. This is a cross-sectional study including 481 firms in 2007. The authors used quoted depth, volume, and zero-returns proportion as proxies for stock liquidity. They find that more independent directors on the board and greater board diligence are related to higher stock liquidity. Karmani and Ajina (2012) investigated the effects of corporate governance mechanisms on stock liquidity in France. Generally, they focused on two governance categories: board composition and audit committee. In particular, they employed eight governance standards, as follows: board size; independent directors; financial expertise of

directors; seniority of directors; number of board meetings; CEO duality; internal audit committee, and external auditor qualities. This study was conducted on 155 firms over a two-year period covering 2008 and 2009. The authors used bid–ask spread, effective spread and price impact ratio as proxies for stock liquidity. Their study finds that better corporate governance mitigates asymmetric information and enhances the stock liquidity of firms. They argue that effective corporate governance is the only warranty of the precision of disclosed information. This statement implies that information asymmetry can be lessened, and informed agents will have fewer chances to access private information at the expense of outside, uninformed shareholders. This in turn can lead to an improvement in stock liquidity.

Moreover, Lei et al. (2013) examined the effects of corporate governance on stock liquidity in China, particularly the Shanghai and Shenzhen stock exchanges. This study employed a sample of 1,472 firms from 2006 to 2008. The authors employed bid–ask spread, depth, and price impact ratio as proxies for stock liquidity. Regarding corporate governance, they developed their own index by using ISS corporate governance. Their index contains ten governance standards, as follows: independent directors; absence of management director; CEO duality; director compensation; management compensation; ownership concentration; largest shareholder; audit quality; management director, and complexity of firm structure. In general, they indicate that mechanisms of corporate governance can mitigate agency costs, and therefore enhance stock liquidity. In particular, more effective governance mechanisms in terms of large shareholders, management compensation and board independence tend to lower the spread, leading to higher stock liquidity.

Prommin et al. (2014) also investigated the effects of corporate governance quality on stock liquidity in Thailand. This study included 100 firms, covering a period from 2006 to 2009. To measure stock liquidity, the authors employed price impact ratio, turnover and liquidity ratio as proxies. Similar to Chung et al. (2010) and Lei et al. (2013), they developed their own index based on ISS corporate governance. Nevertheless, they focused on only two governance categories: board composition and board committees, with the employment of nine governance standards, as follows: independent directors; CEO duality; largest director's shareholding; audit committee; audit committee meetings; audit committee expertise; engagement of auditors; compensation committee, and nomination committee. They find a significantly positive association between the governance index and stock liquidity. This indicates that the higher the corporate governance quality, the more liquid a firm's stocks are.

The findings of a positive relationship between governance quality and stock liquidity are confirmed again by Jiang et al. (2014), who use a similar governance index, based on the ISS. Jiang et al. (2014) examined the relationship between corporate governance, ambiguity, and stock liquidity in the US from 2001 to 2007. They argue that practices of corporate governance, such as compensation and effective board structure, can reduce agency problems, protect shareholder rights and prevent expropriation of resources by large shareholders. These practices of corporate governance can also improve stock liquidity by decreasing ambiguity.

Recently, Ali et al. (2017) have examined the relationship between the quality of corporate governance and stock liquidity in Australia. The investigation was conducted on 1,207 firms covering a timespan from 2001 to 2013. Stock liquidity is measured by bid–ask spread, zero return, price impact ratio, liquidity ratio, turnover, number of trades and trading volume. The authors employed 17 governance standards, which are distributed primarily across board composition (independent directors, independent chairman and board diligence) and committees (audit, nomination and remuneration committees). Once again, a positive relationship between the quality of corporate governance and stock liquidity was obtained due to the mitigation of asymmetric information, which in turn mitigates trading cost for shareholders.

Al-Jaifi et al. (2017) examined the effects of strength of corporate governance on stock liquidity in Malaysia. This study employed a sample of 505 firms from 2009 to 2012. The authors employed price impact ratio as a sole proxy for stock liquidity. Regarding corporate governance, their index contains the following governance standards: board size; board independence; financial expertise; board meetings; internal audit function; audit committee, and audit quality. They indicate that effective corporate governance can enhance both financial transparency (disclosing more relevant information) and operational transparency (protecting the interests of small shareholders), and therefore stock liquidity. They find that corporate governance has a positive relationship with stock liquidity in Malaysia.

To sum up, it is apparent first that the above-mentioned studies were conducted in the US (Chung et al., 2010), Australia (Ali et al., 2017), France (Karmani and Ajina, 2012) and emerging stock markets (Foo and Zain, 2010, Lei et al., 2013, Prommin et al., 2014, Al-Jaifi et al., 2017), whilst the relationship between corporate governance quality and stock liquidity has not yet been studied in the UK. Secondly, these studies tend to focus on certain governance categories (e.g. only board composition and committees (Prommin et al., 2014, Ali et al., 2017,

Karmani and Ajina, 2012, Chung et al., 2010) and a few governance standards (e.g. only independent directors and audit committee (Foo and Zain, 2010). Third, most of these studies use ISS to construct their governance index (Chung et al., 2010, Lei et al., 2013, Prommin et al., 2014, Jiang et al., 2014). This thesis, however, constructs a corporate governance quality index that is suitable for the nature, needs, size and structure of small and growing firms such as those listed in the AIM, by following the guidelines and principles of the QCA Code. The index contains 40 governance standards contained in the QCA Code. These standards are distributed across four main categories: board composition; board committees; board transparency, and remuneration policy structure.

3.3.2 Empirical Studies on Ownership Structure and Stock Liquidity

The impact of ownership structure on stock liquidity has received extensive attention in the last two decades. The root of the relationship between ownership structure and stock liquidity can be attributed to concentrated versus dispersed ownership, and the separation of ownership from control (Berle and Means, 1932, Maug, 1998). Previous studies in the literature have shown that concentrated ownership is more likely to face the free-rider problem than dispersed ownership, because the former bears the monitoring costs alone and the latter benefits from the monitoring efforts of ownership concentration. The effect of free riding relies on the equilibrium size of the concentrated ownership, which also leads to the "lock-in effect" and the "liquidity effect". The lock-in effect refers to the situation where concentrated ownership that owns more shares a firm has more return on the firm's shares. Therefore, this situation biases ownership concentration towards intervention. The liquidity effect occurs when a large proportion of a firm's shares are possessed by concentrated ownership and fewer shares are owned by dispersed ownership, leading to a reduction in market liquidity (Maug, 1998).

Furthermore, market makers are deemed to be liquidity providers, as they are always in a position to buy and sell stocks from or to all market participants at determined prices. As noted by Bagehot (1971), there are two main types of investors in the stock market. The first type refers to investors who have superior or private information and aim to trade for profit. The other type comprises investors who tend to be motivated by liquidity, and do not possess superior or private information. Their primary trading purpose is to convert their shares into cash, and vice versa. According to the classifications, Bagehot (1971) argues that market makers tend to lose when dealing with the first type of investors. However, market makers tend to make gains from trading against liquidity-motivated traders. To balance the market activities

and sustain the trading platforms of market makers, it is important that the gains obtained from liquidity-motivated investors outweigh the losses suffered to privately-informed investors with private information.

Following Bagehot (1971) explanations, both informed traders and liquidity-motivated traders are discussed with regards to their effect on stock liquidity. On the one hand, prior theoretical studies have shown that informed traders speculate or trade based on superior or private information. Thus, when they trade, market makers expand the bid–ask spread, which leads to a reduction in stock liquidity (Glosten and Milgrom, 1985, Easley and O'Hara, 1987, Kyle, 1985). Also, Maug (1998) indicates that large investors achieve profits by exploiting their monitoring of management and therefore trading on private information at the expense of small investors. On the other hand, Amihud et al. (1999) argue that liquidity traders have fewer resources and incentives to monitor firms' managers compared to large shareholders. Also, they find that firms with a high level of liquidity traders (dispersed ownership) have a higher stock liquidity. Maug (1998, p. 67) also states that small shareholders or uninformed investors "are only willing to hold shares at an adverse selection discount that reflects the expected loss from trading with informed investors in the future". Bolton and Thadden (1998) mention that in markets that are characterised by dispersed ownership, such as the UK and the US, the turnover is mostly higher than in markets with concentrated ownership. They indicate that firms that have high levels of dispersed ownership are positively affected in terms of stock liquidity since there are more investors trading these firms' shares. However, the likelihood of effective corporate control in these firms is lower.

Given the above explanations of the role of both informed and liquidity traders in affecting stock liquidity, prior studies have reached two conclusions/standpoints. The first is adverse selection, which argues that informed ownership, i.e. insider ownership holds a high proportion of a firm's outstanding shares and has superior information in comparison to other shareholders. Thus, asymmetric information arises, which leads to reduced stock liquidity (Easley and O'Hara, 1987, Glosten and Milgrom, 1985, Grossman and Hart, 1986, Kyle, 1985). The second is the trading standpoint, which argues that shareholders, mostly institutional ownership, repeatedly turn over their portfolios. Their aggressive trading should reduce transaction costs, which leads to a positive influence on stock liquidity (Merton, 1987, Demsetz, 1968, Schwartz and Shapiro, 1992). However, as discussed in Section 2.6, the role of institutional shareholders in the AIM may be different to their role in large and well-

established markets. In detail, approximately 50% of the AIM's floating shares are allocated to institutional ownership rather than to the public (Arcot et al., 2007). These institutions mainly control the investments of the AIM (Ali, 2012) and are considered knowledgeable and experienced investors, as well as long-term investors. They are actively involved in the monitoring of the firms' management (Arcot et al., 2007). Thus, these shareholders may be regarded as informed traders and they are able to access private information about the firm.

Based on these two channels, empirical research on the effect of ownership structure, including insider ownership, institutional ownership, ownership concentration and minority shareholders, on stock liquidity emerged and has been developing rapidly. This section will subsequently discuss in detail each aspect of the ownership structures studied in this thesis in relation to stock liquidity.

3.3.2.1 Insider Ownership and Stock Liquidity

Prior studies of ownership structure have regarded insider ownership as informed traders (Bettis et al., 2000, Jaffe, 1974, Lin and Howe, 1990, Lakonishok et al., 2001, Rubin, 2007). Seyhun (1986) states that due to the possession of more private information, insiders can anticipate the future movements of stock prices. Hence, they tend to sell/buy stocks prior to a price decline/increase. When insiders trade, asymmetric information increases (Chiang and Venkatesh, 1988, Glosten and Milgrom, 1985, Næs, 2004, Zhou, 2011). As a result, market makers increase the bid–ask spread in order to reduce their asymmetric losses, which in turn dampens stock liquidity (Chiang and Venkatesh, 1988, Dennis and Weston, 2001, Rubin, 2007). Besides this, Holmström and Tirole (1993) indicate that when insiders decide to decrease their proportion of shares in the firm, stock liquidity should be improved, since there will be a higher number of shares available for new active investors.

Empirically, the majority of preceding studies have found a significant and negative relationship between insider ownership and stock liquidity, whilst a few other studies have found an insignificant relationship. For instance, Glosten and Harris (1988) conducted a study of 250 firms on the NYSE from 1981 to 1983. They find an insignificant relationship between spread and insider ownership. In contrast, Chiang and Venkatesh (1988) examined 63 NYSE firms between January and December 1973. Their findings indicate that insider ownership and spread are positively correlated, i.e. insider ownership decreases stock liquidity. They argue that as market makers consider insiders to be informed traders due to their direct access to

private information and corporate control, they tend to set a higher bid–ask spread to prevent the traders' exploitation of this information for profit.

Kini and Mian (1995) re-examined the study of Chiang and Venkatesh (1988) with an updated period and a larger sample size. Their study employed a cross-sectional data set of 1,063 companies on the NYSE in 1985. In contrast to the findings obtained by Chiang and Venkatesh (1988), they find no relation between insider ownership and the bid–ask spread. Accordingly, they argue that information asymmetry may not be related to insider ownership. Sarin et al. (2000) employed the OLS to analyse 786 companies on the AMEX and NYSE in 1985. They find a significant positive relationship between insider ownership and the quoted bid–ask spread and an adverse relationship between insider ownership and the quoted depth. Overall, the findings indicate that insiders negatively affect stock liquidity.

Furthermore, Dennis and Weston (2001) examined the impacts of insider ownership on the quoted bid-ask spread in the NYSE, AMEX, and Nasdaq. Their study is based on a dataset comprising 5,500 companies covering a period from 1997 to 1998. They find that the higher the degree of insider ownership in a firm, the higher the quoted bid-ask spread, i.e. the lower the stock liquidity. Intriguingly, some studies distinguish executive insiders from non-executive insiders and test their effects on stock liquidity, such as Næs (2004), who finds that the major insiders, who are well aware of daily firm operations such as managers, tend to adversely affect stock liquidity. Comerton-Forde and Rydge (2006) examined the relationship between insider ownership and stock illiquidity. This study was conducted in Australia between 1998 and 2003 on 667 firms. The authors employed both turnover ratio and price impact ratio as proxies for stock liquidity. They find that the associations between insider owners who hold 5% of stake or lower – as well as those that hold between 5% and 10% – and stock liquidity is significantly positive. Nevertheless, the association between insider owners who hold 10% or more and stock liquidity is significantly negative. As a result, they conclude that higher holding of insider ownership in a firm tends to impose stronger negative effects on stock liquidity.

Gorkittisunthorn et al. (2006) investigated the relationship between insider traders and bid–ask spread in Thailand during stock splits by investigating 107 firms during the period between 2000 and 2004. They find that stock liquidity increases after stock splits. Besides this, they find that firms with a low level of insiders have more stock liquidity, especially before stock splits. Similarly, Rubin (2007) conducted an investigation on the NYSE between 1999 and 2003 with 1,369 firms. To capture the stock liquidity, this study employed a number of different

measurements. These included stock volume, turnover, depth, bid–ask spread, effective spread, realised spread, and price impact. Rubin obtained negative associations between insider ownership and some of the liquidity measurements, such as trading volume, and positive associations with other measurements, such as illiquidity ratio, quoted spread, realised spread, and effective spread. These findings imply that insiders negatively affect stock liquidity. Additionally, Zhou (2011) investigated the impacts of insider ownership on stock liquidity. Zhou's study examined 1,369 firms on the NYSE between July and September 2000. The finding of this study is that insider ownership and both quoted spread and effective spread are found to be positively correlated. In other words, insiders mitigate stock liquidity.

Gjerde et al. (2013) studied the relationship between inside traders, transparency and stock liquidity in Chile. The investigation was conducted on 152 firms from 2009 to 2010. They employed turnover, price impact, effective spread and realized spread as proxies for stock liquidity. They find that firms with little trading tend to have high levels of insider ownership. That is, insiders reduce stock liquidity. They argue that since transparency is reduced, investors are likely to follow insider strategies. Market makers in turn increase the cost of informational trading. In contrast, when transparency is increased, investors shift their trading strategies from insider trading to fundamental trading. Following the same research stream, Iskandrani et al. (2015) conducted their investigation in the main market of the UK from 2003 to 2012. They proxied stock liquidity using bid–ask spread, illiquidity ratio, trading volume, number of trades and trade size. They found that insider ownership has a negative relationship with trade size, turnover, trading volume and number of trades. In contrast, they found that insider ownership positively affects price impact ratio and bid–ask spread. All these findings conclusively demonstrate that insiders negatively influence stock liquidity due to their access to private information.

Overall, it is apparent that most previous studies regarding the relationship between insider ownership and stock liquidity were conducted in the US (Glosten and Harris, 1988, Chiang and Venkatesh, 1988, Kini and Mian, 1995, Sarin et al., 2000, Dennis and Weston, 2001, Rubin, 2007, Zhou, 2011), whilst a few studies is found into the main market of the UK (e.g., Iskandrani et al., 2015). The composition and definition of insider ownership are different between the UK and the US. In the UK, insider ownership comprises both executive and non-executive directors (board of directors). In contrast, Fidrmuc et al. (2006) state that the concept of insider ownership in the US includes directors, officers, large shareholders, and employees

who hold 10% or more of a firm's shares. Besides this, the board of directors in the UK has a majority of insiders and a minority of outside directors, whereas outside directors represent the majority of board members in the US (Gillette et al., 2008). Given these differences between the UK and the US, it is worth undertaking more investigation of the role of insider ownership in affecting stock liquidity in the UK, especially in the AIM, a market which has not been investigated yet.

3.3.2.2 Institutional Ownership and Stock Liquidity

Whilst different sources across the literature seem to reach a similar view that insider ownership is likely to be informed traders, such conformity has not been achieved for institutional ownership. On the one hand, some studies have argued that institutional shareholders are considered an important monitoring factor of a firm, as each shareholder tends to hold a large equity stake. With their power of ownership and networking, they may possess access to firms' private information (Shleifer and Vishny, 1997, Demsetz, 1983). Furthermore, those institutional shareholders are better informed than small or individual investors (Bartov et al., 2000, Dennis and Weston, 2001).

On the other hand, it is argued that although institutional owners may be better at obtaining and processing information, they do not have access to superior information about the firm compared to insiders. Since institutional traders do not only concentrate on one investment like inside traders, institutional traders may have little incentive to monitor the management of the firm. Generally, institutional traders are considered liquidity traders (Chiang and Venkatesh, 1988). Besides this, institutional owners repeatedly turn over their portfolios. Their aggressive trading should reduce transaction costs, which leads to a positive influence on stock liquidity (Merton, 1987, Demsetz, 1968, Schwartz and Shapiro, 1992). Coffee (1991) also indicates that institutional shareholders in the US hardly take action in monitoring a firm's management due to considering liquidity a higher priority than playing a monitoring role in the corporation. Over-regulation may be a factor limiting the activism of institutional shareholders.

Nevertheless, since debate is still ongoing about whether institutional traders are informed through access to private information, their effects on stock liquidity are still ambiguous. Empirically, Chiang and Venkatesh (1988) examined the impacts of institutional ownership on the bid–ask spread. Their findings indicate that institutional ownership has no relation with the spread, and therefore does not influence stock liquidity. Næs (2004) obtained similar findings,

such as institutional ownership having no relationship with any proxies of stock liquidity being employed, i.e. quoted, relative, adverse, and effective spread. This study was conducted into 88 firms on the Oslo Stock Exchange (OSE) between 1999 and 2001.

On the other hand, Sarin et al. (2000) find that institutional ownership decreases stock liquidity, based on the increased bid–ask spread and decreased quoted depth. However, they find no relationship between institutional ownership and adverse selection. Intriguingly, they obtained the opposite results when they employed simultaneous equations. Specifically, they find that institutional ownership is adversely correlated with bid–ask spread, but positively correlated with trading volume. This suggests that institutional ownership increases stock liquidity. In the study by Dennis and Weston (2001), stock liquidity is proxied by bid–ask spread, probability of informed trading, and adverse spread. They find positive associations between institutional ownership and bid–ask spread as well as adverse spread. Hence, they suggest that institutional ownership negatively affects liquidity and these institutions are considered informed.

In contrast, Kini and Mian (1995) argue that as institutional owners in the US cannot be regarded as informed traders, since they face stricter legal and political constraints, they are prevented from accessing private information, and from monitoring the management of the firms. Furthermore, they argue that the greater the firm's institutional ownership, the higher the analyst following. This results in more disclosure about the firm, which in turn may decrease the spread. Confirming this argument, their empirical results show that institutional ownership reduces bid–ask spread, i.e. leads to higher stock liquidity.

Jennings et al. (2002) investigated the effect of institutional ownership on quoted spread and adverse selection spread by employing the Granger causality test. This study was conducted on Nasdaq firms between 1983 and 1991. The authors find that institutional ownership is adversely associated with quoted spread. To justify their findings, they argue that institutional ownership decreases liquidity cost services by moderating asymmetric information, hence stock liquidity is increased. Fehle (2004) investigated the effects of institutional ownership on stock liquidity of 10,107 companies on the NYSE from 1980 to 1996. The author employed both quoted spread and effective spread to capture stock liquidity. The author finds that institutional ownership has an adverse relationship with both quoted spread and effective spread, i.e. higher stock liquidity. Fehle argues that such a positive relationship can be attributed to the trading restrictions placed on some types of institutions, which lead to a decrease in the bid–ask spread.

Comerton-Forde and Rydge (2006) examined the impact of institutional ownership on stock illiquidity. They find that the institutional ownership has a positive correlation with turnover ratio and a negative correlation with price impact ratio. These results suggest that institutional ownership positively affects stock liquidity. Moreover, Rubin (2007) suggests a positive relationship exists between institutional ownership levels and stock liquidity. Specifically, Rubin finds that institutional ownership positively influences both depth and trading volume, whilst negatively influencing quoted spread and effective spread. The author argues that the existence of such a relationship may be because institutional investors tend to trade more than other types of investors. Consistently, Brockman et al. (2009) find that institutional shareholders have positive effects on turnover ratio and number of trades on the NYSE and AMEX.

Zhou (2011) explored the impacts of institutional ownership on stock liquidity. He finds that institutional ownership positively affects stock liquidity. Jiang et al. (2011) examined the effects of institutional ownership on stock liquidity in the NYSE, AMEX and Nasdaq between 2003 and 2004. They measured stock liquidity by quoted spread, effective spread, market quality index, and price impact. They find that institutional ownership tends to have narrower effective and quoted spreads, a smaller price impact and greater market quality index. Overall, institutional ownership has a positive relationship with stock liquidity. They also indicate that changes in stock liquidity are significantly associated with changing institutional shareholders over time, which could imply that firms may possibly mitigate asymmetric information and enhance stock liquidity by means of increasing institutional shareholders.

Studying the same topic in the US from 1980 to 2010, Blume and Keim (2012) find that number of institutions imposes stronger negative impacts on stock price impact ratio than institutional ownership, i.e. number of institutions has a positive relationship with stock liquidity. Besides this, they find that institutions, particularly hedge funds, preferred to invest in small firms rather than large firms over the investigated period. Meanwhile, Liu (2013) finds that number of institutions positively affects stock liquidity on the NYSE and the AMEX from 1980 to 2007. Poon et al. (2013) examined the relationship between institutional ownership and stock liquidity in the US before and during the global financial crisis for the period covering 2004 to 2008. In general, they find that institutional ownership has a negative relationship with stock liquidity. In detail, they reveal that the sell-side herding of institutional ownership increased both liquidity risk and bid–ask spread during the financial crisis. However, the buy-and-hold

investment strategy of institutional ownership did not influence stock liquidity during the crisis. In this regard, they argue that institutional owners preferred to dispose of their shares during the financial crisis as those institutions are exposed to high risk aversion, tight risk management or high selling needs due to funding constraints.

In a similar manner, Tran et al. (2018) also explored the relationship between institutional ownership and stock liquidity during and after the global financial crisis of 2007–2009 on the Vietnamese stock market. Their study comprises data from 619 firms from 2007 to 2013. They employed several liquidity proxies, such as relative spread, illiquidity ratio, depth of stock, zero-return measure and turnover. Nevertheless, they find that institutional ownership had no effect on stock liquidity during the financial crisis, but had a weak effect on stock liquidity after the crisis. Carrying out a study on 162 firms in France from 2007 to 2009, Ajina et al. (2015) employed the OLS method and find that institutional ownership has a significant positive relationship with stock liquidity. In this study, they employed illiquidity ratio, trading volume and bid–ask spread as proxies for stock liquidity. The authors attribute the obtained effects of institutional ownership to the intensive trading activity of institutional traders. Recently, Iskandrani et al. (2015) once again confirmed the positive association between institutional ownership and stock liquidity in the UK market.

Overall, despite an extensive body of literature focused on the impacts of institutional ownership and stock liquidity, the obtained findings remain inconsistent. In particular, some studies obtained negative relationships (e.g., Dennis and Weston, 2001, Sarin et al., 2000), some obtained positive relationships (e.g., Zhou, 2011, Kini and Mian, 1995) and a minority found no significant linkage (e.g., Chiang and Venkatesh, 1988, Tran et al., 2018, Næs, 2004). The potential justification for such discrepancies may be because of the natures and characteristics of the trading institutions, which may make them either informed or non-informed traders. With regard to institutional shareholders in the AIM, the role of this ownership may be different to its role in large and well-established markets. In detail, approximately 50% of the AIM's floating shares are allocated to institutional ownership rather than to the public (Arcot et al., 2007). These institutions mainly control the investments of the AIM (Ali, 2012) and are considered knowledgeable and experienced investors, as well as long-term investors. They are actively involved in the monitoring of the firms' management (Arcot et al., 2007). A logical reason behind this may be the lower trading volumes of the AIM, which may make it more difficult for these institutions to perform a frequent turnaround of their

investments in AIM stocks. As a result, institutional shareholders of AIM stocks may exercise more monitoring, since they are less likely to unload their positions as frequently as in, for example, the main market of the UK. Thus, these shareholders may be regarded as informed traders and they are able to access private information about the firm. As a result, the differences between institutional investors in the AIM and those in well-established markets, e.g., the US and UK main board, provide more motivation to investigate the role of this ownership in the AIM.

3.3.2.3 Ownership Concentration and Stock Liquidity

Another aspect of ownership structure is the ownership concentration of firms. Prior studies have argued that concentrated ownership is regarded as informed traders (Comerton-Forde and Rydge, 2006, Barclay and Holderness, 1991, Heflin and Shaw, 2000, Jacoby and Zheng, 2010), as the shareholders may have access to private information about firms (Bhide, 1993, Brockman et al., 2009, Heflin and Shaw, 2000). Therefore, this type of ownership structure tends to negatively affect stock liquidity (Brockman et al., 2009, Jacoby and Zheng, 2010, Heflin and Shaw, 2000, Rubin, 2007). Bhide (1993) also states that although active shareholders, such as concentrated ownership, monitor firm management and reduce agency costs, they access private information, which increases asymmetric information and therefore decreases stock liquidity. Empirically, the relationship between ownership concentration and stock liquidity has received great attention in the literature. Kini and Mian (1995) examined the impact of blockholder ownership on the bid–ask spread. They state that as stock blockholders own high percentages of firm's shares, they extensively monitor firms' managers, and as a result they tend to have access to inside information. Nevertheless, their results reveal insignificant association between blockholder ownership and the bid–ask spread.

Moreover, Heflin and Shaw (2000) investigated whether concentrated shareholders, who own more than a 5% stake in the company, can influence firm stock liquidity. They examined 260 firms on the NYSE and captured their stock liquidity using different measurements. These include adverse selection spreads, effective spreads, total spreads, and depths. The study divided blockholders into manager blockholders (i.e. internal ownership) and non-manager blockholders (i.e. external ownership). They find that blockholder ownership, regardless of whether it is internal or external, is associated with larger adverse selection spread, effective spread and total spread, but lower quoted depths. These findings imply that blockholder ownership negatively influences stock liquidity. Consequently, it is concluded that the greater

the number of blockholders in a firm, the lower its stock liquidity. The authors argue that as blockholders are large shareholders, they tend to extensively monitor the firm's managers, leading to their possession of superior knowledge about the firm and access to private information. Accordingly, market makers raise the spread, causing stock liquidity to diminish.

The existing literature also considers the important roles played by large shareholders in firms. In this regard, Næs (2004) indicates that large shareholders are likely to have stronger incentives and more resources to control and monitor firm management. In addition, Næs finds that the five largest shareholders impose stronger negative impacts on firm stock liquidity compared with the insider ownership. Similarly, Attig et al. (2006) investigated the impacts of ultimate control ownership on stock liquidity. This study was conducted in Canada with a sample of 1,031 firms in 1996. The authors employed quoted spread and adverse selection spread to measure stock liquidity. The findings indicate that a larger separation between ownership and ultimate control may lead to more asymmetric information, resulting in higher bid–ask spread, i.e. lower stock liquidity. The authors argue that as large shareholders possess private information for monitoring purposes, they tend to trade based on this privileged information. This potentially results in increased spread and lower stock liquidity.

Comerton-Forde and Rydge (2006) examined the effects of concentrated ownership on stock illiquidity. They employed the 20 largest shareholders as proxy for large shareholders, and find that these largest shareholders impose negative impacts on stock liquidity. Focusing on the same topic, Rubin (2007) employed two proxies for the concentration of ownership: blockholder (i.e. ownership of 5% or higher) and the five largest shareholders. He finds a negative relationship between both measures of ownership concentration and stock liquidity.

As noted by Gaspar and Massa (2007), although more blockholder ownership can lead to better corporate governance of the firm, it is still a factor that damages stock liquidity. Furthermore, Brockman et al. (2009) carried out a study of 1,225 firms on the NYSE and AMEX between 2000 and 2006 to investigate the impacts of the blockholder ownership on stock liquidity. They employed price impact ratio, bid–ask spread and adverse selection components as proxies for informational friction and depth, and trading volume and number of trades as proxies for real friction. They found that block ownership has a negative relationship with informational friction variables, and a positive relationship with real friction variables. This indicates that block ownership is negatively correlated with stock liquidity. To justify the findings regarding the negative relationship between block ownership and informational friction, the authors argue

that block ownership often trades on non-public information against non-block ownership. Therefore, stock liquidity tends to be reduced due to the higher cost of informational friction. On the other hand, regarding the positive relationship between block ownership and real friction, they argue that block ownership can influence the real friction component of stock market liquidity by suppressing the trading activity of the firms. Particularly, as blockholders tend to trade less than non-blockholder owners, this type of ownership causes a reduction in the firm's trading activity and an increase of real friction costs by spreading the real costs over a small number of trades.

Additionally, Jacoby and Zheng (2010) conducted a study in the NYSE, AMEX, and Nasdaq for the year of 1995 with 3,576 firms. To measure stock liquidity, they employed probability of informed trading, bid–ask spread, volume, and depths. The findings of this study are twofold. First, for the NYSE and AMEX, blockholder ownership positively influences probability of informed trading and bid–ask spread whilst negatively influencing trading volume and depth. These results indicate a decrease in stock liquidity with block ownership. Second, for the Nasdaq, blockholders have a positive association with both bid–ask spread and trading volume. Although these findings imply contradictory conclusions on stock liquidity, it can be understood that blockholders may have a negative relationship with information friction but a positive relationship with real friction.

Ginglinger and Hamon (2012) examined the effect of pyramids, double voting rights and insider block ownership on stock liquidity in 918 firms in France from 1998 to 2003. They found that pyramids are negatively associated with stock liquidity, since they increase information asymmetry. On the other hand, double voting rights decrease information asymmetry and improve stock liquidity, especially for small firms. Regarding insider blockholder ownership, they obtained a finding consistent with the literature; namely, that stock liquidity is negatively affected. Most recently, Iskandrani et al. (2015) and Staglianò et al. (2018) once again confirm the findings obtained in the literature by investigating the effects of ownership concentration on stock liquidity for the UK and the Italian markets, respectively. They employed a different set of measures for stock liquidity, and obtained a negative influence of the concentrated ownership of stock liquidity.

Overall, research on ownership concentration and stock liquidity has been thoroughly studied in different markets, though it is apparent that the most of the previous studies regarding the relationship between ownership concentration and stock liquidity were mainly conducted in

the US (Kini and Mian, 1995, Heflin and Shaw, 2000, Rubin, 2007, Brockman et al., 2009, Jacoby and Zheng, 2010) whilst only few studies are found on the main market of the UK (e.g., Iskandrani et al., 2015). The disclosure requirements of ownership in the UK differ from the US market. In detail, any identity which possesses 3% or more is required to disclose its holdings in the UK market, whereas in the US any identity that possesses 5% or more is required to disclose its holdings (Short and Keasey, 1999). Consequently, the UK disclosure requirements appear to be tighter than those of the US. Furthermore, it has been argued that the AIM has lower investor protection and higher ownership concentration (Mortazian et al., 2018), whereas the main market has higher investor protection and level of ownership dispersion (Mortazian et al., 2018, Franks and Mayer, 2017, Porta et al., 1999). As a result, the differences between ownership concentration in the UK and the US, as well as the important role of concentrated ownership in the AIM, provide more motivation to investigate the role of this ownership in the AIM.

3.3.2.4 Minority Shareholders and Stock Liquidity

Whilst the vast majority of existing studies have placed extensive focus on insider, institutional and concentrated ownership and their relationships with stock liquidity, minority shareholders are relatively ignored. When a firm is owned by a large number of small shareholders, it is deemed to have a dispersed ownership. Since each shareholder only possesses a small stake in the company, it is difficult and/or there is probably no sufficient incentive for them to monitor and control the firm's management (Ragazzi, 1981). Therefore, these minor shareholders may not get access to the firm's inside information, and are uninformed. Consequently, Bhide (1993) and Kothare (1997) argue that when a firm's ownership is strongly diluted, the stock of the firm is likely to be liquid due to relatively small bid–ask spread. In addition, Bolton and Thadden (1998) mention that in markets that are characterised by dispersed ownership, such as the UK and the US, stock liquidity tends to be higher than in markets with concentrated ownership, since the trading activities on those firms' shares are more vigorous. Similarly, Amihud et al. (1999) find that firms with a high level of liquidity traders (i.e. dispersed ownership) tend to have higher stock liquidity. Nevertheless, these studies raise the concern that despite such positive impacts of dispersed ownership on stock liquidity, one of its main drawbacks is the likelihood of less effective corporate control and higher agency conflicts.

Following a thorough review of the literature, to the best of my knowledge only two studies have empirically examined the relationship between minority shareholders and stock liquidity.

Those are the studies of (Jacoby and Zheng, 2010, Wang and Zhang, 2015). In particular, Jacoby and Zheng (2010) employ number of shareholders as a proxy for dispersed ownership. They find that ownership dispersion plays an important role in enhancing stock liquidity. The findings of Jacoby and Zheng (2010) are later confirmed by Wang and Zhang (2015). This study was conducted on the NYSE between 2004 and 2011. It employs the Amihud illiquidity ratio as a sole proxy for stock illiquidity and as the proxies of the minority shareholder, it employs trading volume and number of trades. The study finds that firms with stronger trading activities by individual shareholders tend to have greater stock liquidity, as information asymmetry can be reduced.

Overall, it is apparent that only a few studies investigate the relationship between minority shareholders and stock liquidity (Jacoby and Zheng, 2010, Wang and Zhang, 2015). The two studies, which were conducted in the US, employ indirect proxies[27] for small shareholders, e.g. number of shareholders, trading volume and number of trades. This thesis however contributes to the literature by employing a direct proxy for minority shareholders in the AIM (i.e. the percentage of shares held by small shareholders, who hold less than 3% of a firm's shares).

3.3.3 Empirical Studies on Ownership Identity and Stock Liquidity

In addition to corporate governance quality and ownership structure, another objective of this thesis is to determine the association between ownership identities and stock liquidity. A number of empirical studies have identified different effects of different types of ownership identity on stock liquidity (Jennings et al., 2002, Næs, 2004, Chung and Zhang, 2011, Fehle, 2004). For instance, Næs (2004) suggests that the capabilities and incentives to monitor and control a firm's management are thought to rely on both the owner type and owner concentration. In this regard, the study concludes that large non-financial ownership tends to impose stronger negative effects on the relative spread compared to other shareholders. Jennings et al. (2002) also state that institutional ownership may have different impacts on stock liquidity depending on the identities and the level of concentration of those institutions. This may be because different identities of the institutions, such as endowment funds, pension funds, independent advisers, insurance firms and bank trusts, have different investment

[27] This may be because of the lack of information on the minority shareholders due to the difficulty of finding data for shareholders who hold small proportions of firms' shares (i.e. less than 3% of the firms' shares in this study).

preferences due to their differences in fiduciary responsibilities (Chung and Zhang, 2011) and in behaviours (Coffee, 1991).

Based on these views regarding ownership identity, this study examines eight identities of ownership and their relationships with stock liquidity. The eight investigated ownership identities are free float ownership, investment bank ownership, foreign ownership, government ownership, pension fund ownership, employee ownership, cross-holding ownership and other-holding ownership. Subsequently the section will review the literature and discuss the relationship between these ownership identities and stock liquidity.

3.3.3.1 Free Float Ownership and Stock Liquidity

Free float shares are referred to as the number of outstanding shares available to the public, where shares held by founders, management and board members, corporations, and government are excluded since those shares are mostly held for long-term control purposes (Chan et al., 2004, Ding et al., 2016). Building on this definition, this study conjectures that free float shareholders can affect stock liquidity by changing the firm's trading activity. Specifically, when a firm has more blockholders, its free float shares will decrease. Thus, the number of shareholders will be lower than a firm owned by small shareholders, leading to lower trading activity and stock liquidity. In this regard, Ciner and Karagozoglu (2008) indicate that firms with lower numbers of free float shares tend to have more problems with asymmetric information.

Acknowledging their importance in market liquidity, and as discussed in Section 2.6, the FTSE group announced in 2011 that to be listed in the FTSE UK Index Series, the minimum percentage of shares which are free float shares must be 25%, rather than 15% for UK-incorporated firms, and for non-UK-incorporated firms, the figure needs to be greater than 50% (FTSE, 2019, p. 14). This change aims to enhance stock liquidity, reduce the concerns of excessive control of large ownership on firms and protect the minority shareholders (Ding et al., 2016). Nevertheless, it is worth mentioning that this change does not include firms listed on the AIM. As discussed in Section 2.3, the AIM is characterised by having a more flexible and lenient regulation system. Therefore, the levels of free float for the AIM are up for discussion with the NOMAD, i.e. there is no limited/minimum percentage of free float on the market (LSE, 2015b).

Empirically, Park (2009) investigates the impacts of free float shares on stock liquidity. The study employs the Amihud illiquidity ratio, and relative and quoted spreads to capture the liquidity of firm stocks in the main market of the UK between 2002 and 2009. Park finds that free float shares positively affect stock liquidity since they are adversely related to all three employed measures. The same finding is obtained by Ginglinger and Hamon (2012). Recently, Ding et al. (2016) have conducted a large-scale investigation across 55 markets from 2003 to 2011. They used proportion of zero returns as a sole proxy for stock liquidity, and a positive association between free float and stock liquidity was consistently obtained. They argue that free float ownership can enhance stock liquidity by increasing the firm's trading activities and reducing asymmetric information. To the best of my knowledge, only a few studies have examined the relationship between free float ownership and stock liquidity. Hence, it can be seen that the topic has been under-studied given its important role in the market. Additionally, given that the regulation system regarding the free float is different between the main market and the AIM, it is essential to recognise the impact of free float shares on the stock liquidity of the FTSE AIM All-Share Index.

3.3.3.2 Financial Institutional Ownership and Stock Liquidity

Financial institutional owners, particularly life insurance companies and banks, are considered active shareholders. They monitor firms' corporate policies, as well as attempting to have representation on the board to intervene in the investment decisions of firms (Prowse, 1990). Besides this, bank ownership has more ability than other identities to monitor managers, since banks are able to carry the costs of becoming knowledgeable about their client companies (Hoshi et al., 1991). The monitoring role of these banks can in turn allow them access to private information about the firms, which can increase asymmetric information.

The literature finds that different financial institutions may have different effects on stock liquidity. For instance, Jennings et al. (2002) find that insurance companies, commercial banks and investment companies have adverse correlations with bid–ask spread, i.e. increased stock liquidity. Barabanov and McNamara (2002) find that investment firms and independent advisers have stronger adverse correlations with bid–ask spread compared to banks and insurance companies on the Nasdaq between 1983 and 2000. Similarly, Poon et al. (2013) find that bank ownership and insurance company ownership were negatively related to bid–ask spread before and during the financial crisis period. In other words, these ownership identities

positively influence stock liquidity. They argue that banks are likely to follow a herding strategy in order to reduce litigation risks, as also confirmed by Sias (2004).

In contrast, Fehle (2004) finds that investment firm ownership, commercial bank ownership and insurance company ownership positively affect both quoted spread and effective spread. In other words, stock liquidity is decreased with these ownership identities. Similarly, Park (2009) and Liu (2013) find that stock liquidity is reduced by bank ownership. The latter attributes the negative effect of banks' ownership to their passivity. In contrast to the above studies, Ajina et al. (2015) find an insignificant relationship between bank ownership and stock liquidity.

3.3.3.3 Foreign Ownership and Stock Liquidity

In light of the current globalisation and financial liberalisation, the existence of foreign ownership in domestic firms has become more significant than ever. Prior studies have found that foreign owners mostly prefer to hold shares of firms with low unsystematic risk, good accounting performance, low leverage (Kang and Stulz, 1997), good investor protection, disclosure (Leuz et al., 2010), large cash positions and pay low dividends (Dahlquist and Robertsson, 2001). Nevertheless, when it comes to the effects of this ownership identity on stock liquidity, the prediction is largely dependent on whether foreign investors are informed, which, however, remains inconclusive in the literature. For instance, Khanna and Palepu (1999) find that foreign owners may possess stronger ability to monitor firm management in India compared to domestic ownership. In addition, Froot et al. (2008) argue that foreign ownership is considered more informed than local ownership, since foreigners better understand the relevant fundamentals compared to domestic shareholders. In contrast, Hau (2001) and Dvořák (2005) indicate that the performance of local investors is better than foreigners in Germany and Indonesia respectively, since the latter have lower trading profit. However, empirically, the relationship between foreign ownership and stock liquidity remains debated and inconclusive.

For instance, Levine and Zervos (1998) examined the effect of market liberalisation on the local stock liquidity of 16 emerging stock markets. They notice an increase in stock liquidity after foreign investors joined a market. Therefore, the study emphasises that financial liberalisation plays an important role in enhancing the quality of domestic markets. Dahlquist and Robertsson (2001) find that foreign shareholders positively affect stock liquidity on the Swedish stock market from 1991 to 1997. The same findings were obtained by Næs (2004),

who states that foreign ownership has an adverse relationship with bid–ask spread and a positive relationship with quoted depth.

More recently, Ding et al. (2017) investigated the effect of foreign institutional ownership on stock liquidity in China's A-share market between 2004 and 2012 with 1,939 firms. They employed a comprehensive set of measures – including relative spread, realized spread, depth, price impact, the Huang and Stoll measure, trading volume and number of trades – as proxies for stock liquidity. They find that foreign ownership enhances stock liquidity by increasing price discovery and trading activity. Notably, they argue that the enhancement of stock liquidity has no relation with information friction variables, but primarily with real friction variables. Furthermore, Lee and Chung (2018) also obtained a positive association between foreign ownership and stock liquidity. This finding came after studying 13,313 firms in 20 emerging stock markets from 2005 to 2013. They argue that foreign ownership brings benefits to domestic stock markets by lowering trading costs through rising competition in the process of price search. Nevertheless, it may increase the risk of adverse selection for the providers of liquidity.

In contrast with previous studies, many studies have found an opposite relationship. In particular, Rhee and Wang (2009) argue that previous studies have not directly examined the relationship between foreign investors and stock liquidity. Instead, they have mostly focused on explaining the economic and market success after stock market liberalisation. Therefore, the study examines the topic on the Jakarta Stock Exchange by employing monthly data between 2002 and 2007. Intriguingly, foreign institutional ownership held approximately 41% of Jakarta capitalisation, and these foreign shareholders were found to negatively influence domestic stock liquidity. These findings can be attributed to the problem of asymmetric information between foreign and local shareholders.

Similarly, Park (2009) finds that foreign owners tend to reduce stock liquidity. Besides this, the finding was once again confirmed by a large-scale study conducted by Ng et al. (2016) with a sample of 27,828 firms in 39 markets worldwide between 2003 and 2009. They find that if the foreign shareholders are direct investors, stock liquidity is likely to be reduced. On the other hand, portfolio foreign shareholders tend to improve stock liquidity. Furthermore, Deng et al. (2018) conducted their study in 39 markets from 2000 to 2014. They argue that due to a decrease in corporate transparency, foreign institutional ownership negatively influences global stock liquidity.

By reviewing the studies on the foreign ownership and stock liquidity, it can be seen that: (1) a conclusive picture about their relationship has not yet been achieved since some studies find that they are positively related, some find a negative relationship between them, and recently Tran et al. (2018) have concluded that there is no relationship between them, and (2) the topic has been thoroughly studied in emerging stock markets due to the phenomenon of the liberalisation of those markets (e.g., Levine and Zervos, 1998, Ding et al., 2017, Lee and Chung, 2018, Rhee and Wang, 2009). More importantly, foreign owners represent the largest identity in the AIM, where they held 45% and 42.8% of AIM shares in 2014 and 2016 respectively (ONS, 2017). Given the important role of this identity in the AIM, further contributions will be provided to the literature by examining its impacts on stock liquidity in the AIM.

3.3.3.4 Government Ownership and Stock Liquidity

With regard to state ownership, some studies indicate that the control–ownership separation negatively impacts stock liquidity, and the adverse effects are worsened by poorer shareholder protection and government ownership (Chu et al., 2015). Besides this, some studies argue that government ownership is associated with more (1) agency problems between majority and minority shareholders and (2) information asymmetry (Shleifer and Vishny, 1997, Chu et al., 2015, Tran et al., 2018).

Empirically, very few studies have investigated this relationship. This may be because of the increasing process of privatisation making the roles of government ownership less significant (Tran et al., 2018). According to my review, prior studies in the literature consistently find a negative relationship between government ownership and stock liquidity (Næs, 2004, Park, 2009). Recently, Tran et al. (2018) have indicated that state ownership dominates the Vietnamese stock market, i.e. more than 30% of Vietnamese firms have this ownership. They find that state ownership has been negatively correlated with stock liquidity since the global financial crisis. They argue that the negative impact is because state ownership is considered inactive trading, as well as contributing to increasing the agency problem and information asymmetry.

3.3.3.5 Pension Fund Ownership and Stock Liquidity

The literature provides two different explanations for the effects of pension funds on stock liquidity. The first is related to the idea that pension funds are considered long-term investors, i.e., inactive traders, and they have stronger incentives to be involved in the monitoring process of the firm (Dittmar and Mahrt-Smith, 2007, Officer, 2011, Coffee, 1991). Therefore, they are expected to negatively impact stock liquidity. The second explanation is that pension funds are considered liquidity-motivated shareholders (Bushee and Noe, 2000, Dennis and Strickland, 2002). They are able to achieve abnormal returns compared to other shareholders (Cremers and Nair, 2005, Dennis and Strickland, 2002). They trade often to achieve profits, which increases the trading activity of the firm and hence stock liquidity. However, it is important to mention that pension funds are holding only a low proportion of the AIM, as indicated by the Office of National Statistics. This may be because they tend to shun stocks of a high volatility profile such as the AIM.

Empirical studies obtained mixed results regarding the relationship between pension fund ownership and stock liquidity. Fehle (2004) finds a significant negative relationship between pension funds and posted spreads, i.e. increased stock liquidity. On the other hand, whilst Park (2009) found a negative relationship between pension fund ownership and stock liquidity, Poon et al. (2013) and Ajina et al. (2015) found a positive relationship. This may be because pension fund ownership manages a great amount of firm assets, which can contribute to the reduction of transaction costs, thus enhancing stock liquidity.

3.3.3.6 Employee Ownership, Cross-Holding Ownership and Stock Liquidity

Among the mentioned ownership identities, very few studies focus on employee ownership and cross-holding ownership and their relationships with stock liquidity. First, regarding employee ownership, employee benefit plans have become increasingly popular over past decades. In the US, for example, there were 11,000 employee shareholder plans in 2013. In Europe, about 85% of public firms have employee stock shareholder plans (O'Boyle et al., 2016). These employee benefit plans, which are associated with employee ownership, are found to lower employee turnover and increase productivity, which in turn increases the profits of the firm (Livingston and Henry, 1980). These plans, which tie employee payoffs to the firm's performance, can (1) provide incentive contracts that contribute to align the interests of

employees with managers and (2) provide greater participation in the decision-making process (O'Boyle et al., 2016).

Brockman et al. (2009) indicate that employee ownership has a negative but insignificant relationship with real friction variables (i.e. number of trades and turnover ratio). However, this ownership identity negatively influences trade size, yet positively influences bid–ask spread. These findings imply that stock liquidity is reduced with employed ownership. The same result was obtained by Park (2009). The negative relationship could be because employees are unlikely to turnaround their companies' shares frequently; it stands to reason that high employee equity participation reduces liquidity.

Finally, cross-holding ownership is defined as "a situation where a firm holds passive ownership in another firm, which entitles the former firm a share in the latter firm's profits but not in decision making" (Liu et al., 2018, p. 83). Nonetheless, cross holdings may increase the potential of mergers and acquisitions, as well as changing decision-making processes and corporate strategies due to their information advantages (Brooks et al., 2018). Nevertheless, to the best of my knowledge, there is only one empirical work – that of Park (2009) – which has found a negative relationship between cross-holding ownership and stock liquidity.

3.4 Summary

This chapter has introduced and discussed a few related theories that assist in the foundation formation of the whole thesis. In particular, the focus has been primarily on the agency theory, which is considered the most relevant for the study of corporate governance, ownership structure and ownership identities in general, and their relationships with stock liquidity in particular. In brief, agency conflicts commonly arise due to presence of separation of ownership of control, which leads to increase the information asymmetry between the principals and the agents. To resolve those conflicts, the literature has recommended various techniques that can be put into use in practice, and among those resolutions, corporate governance and ownership structure are two factors that have been researched in depth within the academic and practical worlds. On the other hand, the linkages between agency theory and stock liquidity are often referred to as a causal relationship. In other words, stock liquidity changes with the levels of agency conflicts. Specifically, when information asymmetry is high (high agency conflicts), certain market participants are more informed than others, and hence tend to possess more private information about firms. The market makers in turn may increase the bid–ask spread to

prevent those investors from taking advantage of their informational privileges. As a result, stock liquidity may diminish. As agency conflicts are the root of stock illiquidity, if agency conflicts are resolved, stock markets can become more liquid. For instance, adopting effective corporate governance mechanisms can address the issues of agency conflicts as suggested in the literature, hence stock liquidity can be enhanced. Building on this view, the main objective of this thesis is to study the associations between corporate governance quality, ownership structure, ownership identity of firms and stock liquidity.

Following the theoretical framework, the subsequent section provides a thorough review of existing empirical works that have been conducted on the investigated topics of this thesis. In general, the findings obtained by previous studies remain inconclusive. Those discrepancies may be because of many different factors, such as the choices of investigated markets, time period, measures of stock liquidity, corporate governance quality, types of ownership and ownership identities. Furthermore, the literature also shows that certain aspects, such as comprehensive measures of governance quality, state ownership and minority ownership, to mention just a few, are still under-studied and need to be improved. The next chapter will discuss the data and methodology of this study in detail.

Chapter 4 Data and Methodology

4.1 Introduction

The current chapter aims at providing comprehensive information regarding the data and research methodology of the whole thesis. To start with, the chapter discusses the data-collection process, database sources and sample criteria. Subsequently, details of the relevant research variables and their measurements will be explained. These include the main variables, which are stock liquidity, corporate governance quality, ownership structure, and ownership identity, together with other controlling variables such as accounting and market variables. Finally, the chapter will provide information and discuss the statistical methodology of the thesis, followed by a concluding section.

4.2 Sources of Data and Data Sample

As emphasised in previous chapters (particularly Chapter 1 and Chapter 2), this study is conducted in the AIM, which is a sub-market of the LSE. The sample consists of firms listed in the FTSE AIM All-Share Index over a seven-year period from 2010 to 2016. The selection of this period can be justified based on the following two rationales.

Firstly, the study's implementation during this period avoids possible impacts of unobservable exogenous macroeconomic shocks on small and growing firms during the 2007–2009 global financial crisis. The existence of those impacts may potentially distort the impacts of corporate governance and ownership structure on stock liquidity.[28] In this regard, Doukas and Hoque (2016) argue that the global financial crisis has affected small and growing firms listed on the AIM. As a result, both funds raised and listings have declined significantly because of the crisis. Secondly, it has been evident that certain mechanisms of corporate governance, such as board of directors and institutional shareholders, has been subject to some reforms since the crisis. In this regard, responding to the impacts of the global financial crisis of 2007–2009, the Financial Reporting Council (FRC) reviewed the Combined Code 2009 and suggested emphasising two important elements: (1) more concentration must be paid to the spirit of the Code and its letter, and (2) the effects of shareholders in controlling and monitoring the Code

[28] For instance, the turnover value in the AIM, which is considered a measurement of stock liquidity, declined from £75m in 2007 to about £33m in 2009. LSE, AIM Statistics December 2009. See: https://www.londonstockexchange.com/statistics/historic/aim/aim-statistics-archive-2009/dec-09.pdf

must be improved by encouraging interaction between shareholders and boards (FRC, 2010a).[29]

Given that a lot of blame has been put on inadequate firm corporate governance as a reason for the emergence of the crisis (Akbar et al., 2017), these reforms aim at improving the controlling and monitoring process of firms by enhancing the quality of corporate governance and the disclosure levels of firms. In particular, the adoption of more effective corporate governance is significantly critical for small and growing firms. This is because they have been more vulnerable and experienced disastrous consequences during the crisis compared to larger and more established firms (Cowling et al., 2012).[30] As a result, with this study in the AIM, which focuses primarily on small and growing firms, it is important to understand the impacts of corporate governance and ownership structures on firms' operations after the crisis.

As discussed in Section 2.2, the AIM comprises nine non-financial industries and one financial industry, as follows: Basic Materials; Consumer Goods; Consumer Services; Health Care; Industrials; Oil & Gas; Technology; Telecommunication; Utilities, and Financials. The initial sample of the study is 934 firms.[31] Nevertheless, the current study excludes the financial sector (i.e. 274 financial firms), since its regulatory and operating environments are unique and distinct from non-financial firms. Hence, the initial sample is reduced to 660 firms.

Furthermore, firms included in the final sample are required to meet two additional criteria. The first criterion is data availability of firms. In particular, firms with missing stock liquidity or governance data are dropped from the sample (19 firms). Secondly, with the main method of estimation applied in this study, i.e. the system GMM (to be discussed later in Sections 4.4.1 and 4.4.2), it is important that firms have survived in the market for at least five consecutive years will be included in the sample, as the GMM estimation method relies on lagged and differencing variables (Florackis and Ozkan, 2009, Akbar et al., 2017, Charalambakis et al.,

[29] The UK Corporate Governance Code 2010 has replaced the Combined Code 2009. The former emphasised the important roles of institutional shareholders in monitoring the board of directors. It also provided guidance regarding the effectiveness of the board of directors and its committees, e.g. emphasising gender diversity of the board and having a separate risk committee.

[30] Since small firms are considered risky investments, as well as having fewer external financial resources compared to large firms.

[31] The initial sample comprises both active and dead firms taken from Datastream; specifically, firms that were delisted from the market at any given time during the study sample period. The reason for making sure that both active and dead firms are included is to avoid any survivorship bias regarding the sample selection.

2008). This leads to a further drop of 46 firms from the sample, leaving the final sample with 595 non-financial firms (i.e. 4,165 observations over time).

Table 4. 1 Sample Construction for the Study

Initial sample	934 firms
Exclude financial firms	274 firms
Exclude firms with missing market data	19 firms
Exclude firms with less than five consecutive years	46 firms
Final sample	595 firms

Data sources: The data-collection procedure was implemented based on several database sources. Specifically, liquidity and market data, such as bid–ask prices, trading volume, turnover, and stock return, are obtained from Datastream. Following previous studies (Heflin and Shaw, 2000, Iskandrani et al., 2015, Jacoby and Zheng, 2010, Zhou, 2011), this study has collected these variables on a daily basis, and then averages them across each year to obtain annual figures.

On the other hand, as the index measuring corporate governance quality comprises 40 components, those 40 items were collected from the BoardEx database and manually from firms' annual reports.[32] Besides this, data on information disclosure was collected manually from firms' websites. In addition, some ownership structure variables, such as insider ownership, institutional ownership, number of institutions, and analyst following, were obtained from Bloomberg. However, other ownership structure variables, such as minority shareholders, significant ownership and substantial ownership, were obtained from Fame database. For the ownership identity variables (e.g. free float ownership, investment bank ownership, and foreign ownership), data was collected from Datastream on an annual basis.

[32] Some missing governance data was obtained from the Companies House website.

Table 4. 2 Industry Classification of Sample Firms

Industries	Number of Observations	Percentage of Observations in Each Industry
Consumer Services	511	12.27
Basic Materials	791	18.99
Consumer Goods	280	6.72
Health Care	427	10.25
Industrials	819	19.66
Oil & Gas	581	13.95
Technology	651	15.63
Telecommunication	56	1.34
Utilities	49	1.18
Total	4,165	100

4.3 Measurement and Definition of Research Variables

With a brief overview of the data sample being employed, the subsequent section will first provide the definitions of the research variables of the thesis, followed by a detailed explanation and discussion of their quantitative measurements.

4.3.1 Stock Liquidity Variables

Stock liquidity is the main corporate construct and the main dependent variable being focused on throughout the thesis. To measure the stock liquidity of AIM firms, this study employs a comprehensive set of different proxies. Following the study of Stoll (2000), there are two dimensions of stock liquidity which capture the informational friction and real friction of the market. Generally, friction in the financial market is defined as "the price concession needed for an immediate transaction" (Stoll, 2000, p. 1480). Informational friction is referred to as "the potential losses of trading against informed traders",[33] whereas real friction is defined as "the real resources used up in the liquidity-provision process" (Brockman et al., 2009, p. 1404).

More specifically, there are two types of traders in the market: (1) liquidity-motivated traders, and (2) informed traders. The latter tend to trade for the sake of making profits using their own

[33] Some theoretical studies, such as Copeland and Galai (1983), Kyle (1985) and Glosten and Milgrom (1985) indicate that market makers expand the bid–ask spread and decrease the depth when trading against informed traders.

private and superior information at the expense of liquidity traders (Stoll, 2000). This happens mainly because informed traders have inside data to evaluate and justify market price efficiency, and hence implement their arbitrage activities accordingly. When informed investors trade, market makers will respond by widening the bid–ask spread to suppress their profitability, which causes stock liquidity to reduce (Glosten and Milgrom, 1985, Easley and O'Hara, 1987, Kyle, 1985). Therefore, informational friction in the market is a source that dampens stock liquidity (Bagehot, 1971). It is important to say that stocks that are characterised by having large informed traders may be considered inactive stocks. Those stocks require more extensive positioning and participation by liquidity providers (market makers). In order to provide sufficient depth of liquidity and keep price continuity in those stocks, liquidity providers should be prepared to hold sizeable positions for longer periods. Furthermore, positions in inactive stocks may reduce the purchasing power of liquidity providers, thereby decreasing their ability to engage in less risky and profitable trading in active stocks (Tinic, 1972).

On the other hand, real friction can have a positive association with stock liquidity, as the higher the trading level, the higher the chance for sell and buy orders to be fulfilled and balanced throughout the trading period (Tinic, 1972). For instance, when the share turnover is large, it is easier for liquidity providers to make adjustments in their positions due to the significant trading activity can reflect the interests of traders in the stocks. Since active stocks tend to self-equate, the participation of liquidity providers is less necessary in terms of the average holding period and the average size of positions (Tinic, 1972).

A number of empirical studies have justified the negative association between informational friction and real friction. In particular, Stoll (2000) and McInish and Wood (1992) find that real friction (measured by trading volume) is negatively associated with informational friction (measured by quoted bid-ask spread). Following a review of the literature, in this study, informational friction is measured by the bid–ask spread and the price impact ratio, whereas real friction is measured by turnover ratio, trading volume, trade size and number of trades (e.g., Rubin, 2007, Brockman et al., 2009, Ding et al., 2017, Iskandrani et al., 2015). More details regarding the mathematical computations of these measures are provided below.

First, *Quoted bid–ask spread (QBAS)* is considered one of the most popular and widely employed measures of stock liquidity. The bid–ask spread is defined as the division of the

difference between the ask price and the bid price, by the midpoint of the quoted prices (MIDP). The computation of the bid–ask spread can be written as follows:

$$\text{QBAS} = \frac{(\text{ASK} - \text{BID})}{\text{MIDP}} \quad (1)$$

Where, $\text{MIDP} = \frac{(\text{ASK} + \text{BID})}{2}$; ASK is the ask price, and BID is the bid price.

Second, *price impact ratio (PIR)* calculates the effect of order flow on stock prices. When there is an imbalance in the quantity of sell orders and buy orders, which is often caused by information asymmetry, the prices of stock will change accordingly (Amihud, 2002). In this regard, Dennis and Weston (2001, p. 2) mention that "the price impact measure is important since it is based on the unexpected portion of order flow that carries information". Following the recommendation of Amihud (2002), this study calculates price impact ratio by dividing the absolute return by the trading volume as follows:

$$\text{PIR} = \frac{(\text{SR})}{(\text{TV})} \quad (2)$$

Where SR is the stock return, and TV is the trading volume (in thousands).

Third, *trading volume (TV)* is a real friction variable, which is defined as the number of shares traded on a particular day in thousands. Prior studies have reported that a high trading volume indicates a stock's high tradability, and hence high stock liquidity (Chordia et al., 2001). Due to its straightforward measure, the trading volume has already been readily calculated by Datastream.

Fourth, *turnover ratio (TR)* is a real friction variable employed by previous studies to capture stock liquidity (Rubin, 2007, Tinic, 1972). Accordingly, turnover ratio is measured as trading volume to the capitalisation of firms, which can be written as below:

$$TR = \frac{\text{TV}}{\text{NOS}} \quad (3)$$

Where TV is the trading volume, and NOS is the number of outstanding shares.

Fifth, *number of trades (NT)* is defined as the total number of times shares were traded in a day. Thus, the more times a stock is traded, the more liquid it is (Stoll, 2000). Similar to the

trading volume, the number of trades of firms' shares has already been calculated by Datastream.

The last measure of real friction is the trade size (TS). Using a similar mechanism to trading volume and number of trade, a higher trade size indicates higher stock liquidity (Tinic, 1972). Following prior studies, e.g. Iskandrani et al. (2015), this study measures the trade size as follows:

$$TS = \frac{\mathrm{TV}}{\mathrm{NT}} \tag{5}$$

Where TV is the trading volume, and NT is the number of trades.

4.3.2 Corporate Governance Quality and Information Disclosure Variables

The first main explanatory factor is the corporate governance quality, which will be consistently referred to in this thesis as the CGQIAIM. As mentioned previously in Section 2.4, this study is focused on small and growing firms listed on the AIM, which tend to adopt the guidelines and principles of the Quoted Companies Alliance (QCA). The QCA is specifically designed to better suit the nature, needs, and structures of these companies. The QCA principles are primarily built on the UK Corporate Governance Code, but with less detailed, less prescriptive and less demanding principles (Cronin et al., 2012).

The CGQIAIM comprises 40 variables (Table 4.2), which are distributed across four main categories: board composition; board committee; board transparency, and remuneration policy structure. In more detail, the category of board composition contains seven governance standards: CEO/chairman duality; independent chairman; independent directors; senior independent director; firm secretary; gender diversity, and skills and experience. The board committee category comprises ten governance standards focusing on the audit committee, remuneration committee and nomination committee. The board transparency category has 15 governance standards, which include vision and strategy of the firm, risk management and internal control, directors' report and responsibilities, role of external and internal advisers, meetings and attendance records of the board and its committees, relationship with shareholders, results of shareholder voting, chairman's report and performance of the firm. Finally, the remuneration policy structure contains seven governance standards: base salary;

bonus; pension; long-term incentive plans (LTIPs); share options; share ownership, and other remuneration schemes.

In addition, the study also employs the number of regulatory announcements that are released by AIM firms as a proxy for information disclosure. These announcements can include acquisitions and alliances, AGMs and other meetings, board changes, capital structure, directors and shareholders, disposals, holdings in company, results of annual and interim reports and trading updates. However, any news from outside sources such as press releases, analyst reports and any other general news from intermediate sources is excluded. Therefore, this information disclosure variable captures the information issued and directly distributed to the markets by the firms themselves (Ali et al., 2017, Beekes et al., 2015).

Table 4. 3 Construction of the Corporate Governance Quality Index for the AIM (CGQIAIM)

#	Variables	Description	Application	Source
A	**Board Composition**			
1	CEO/Chairman Duality	The chairman should not fulfil the role of chief executive.	1 if the chairman and CEO have a separate role, otherwise 0.	BoardEx
2	Independent Chairman	Best practice is that the chairman is not also the CEO.	1 if the chairman is an independent director, otherwise 0.	BoardEx
3	Independent Directors	A firm should have at least two independent non-executive directors.	1 if the board has at least two independent non-executive directors, otherwise 0.	BoardEx
4	Senior Independent Director	The senior independent director performs a very important role in the firm. E.g. meeting with non-executive directors without the chairman being present and showing leadership in relation to succession planning.	1 if the board has a senior independent director, otherwise 0.	BoardEx
5	Firm Secretary	The firm secretary plays a vital role in relation to both legal and regulatory compliance and ensuring good governance. E.g. the firm secretary should assist the chairman in preparing for and running effective board meetings.	1 if the board has a secretary, otherwise 0.	BoardEx
6	Gender Diversity	Levels of board diversity, including a focus on gender diversity, must be seriously considered by public companies.	1 if the board has a female member, otherwise 0.	BoardEx
7	Skills and Experience	An effective board has a balance of skills, experience and independence.	1 if the board members have previous board experience, otherwise 0.	BoardEx
B	**Board Committees**			
1	Audit Committee	The audit committee plays an essential role by providing confidence to shareholders through the annual report and accounts and other relevant public announcements of the firm.	1 if the firm has an audit committee, otherwise 0.	BoardEx
2	Independent Director of Audit Committee	An independent non-executive director should be appointed to board committees.	1 if the audit committee has an independent director, otherwise 0.	BoardEx
3	Terms of Reference: Audit Committee	The audit committee should have an audit report, which covers e.g. the internal focus of the committee on risk management and internal control and the external focus of the committee on the corporate reporting cycle.	1 if the firm has an audit report, otherwise 0.	Annual Report

4	Remuneration Committee	Remuneration arrangements should be designed to align with the implementation of firm strategy and effective risk management for the long term.	1 if the firm has a remuneration committee, otherwise 0.	BoardEx
5	Independent Director of Remuneration Committee	An independent non-executive director should be appointed to board committees.	1 if the remuneration committee has an independent director, otherwise 0.	BoardEx
6	Terms of Reference: Remuneration Committee	The remuneration committee should have a remuneration report, which covers e.g. factors to consider in setting remuneration policy and communicating with shareholders.	1 if the firm has a remuneration report, otherwise 0.	Annual Report
7	Nomination Committee	The nomination committee should work closely with the board and the chairman to identify the skills and experience required for the directors and to keep a close eye on possible internal candidates for future board roles.	1 if the firm has a nomination committee, otherwise 0.	BoardEx
8	Independent Director of Nomination Committee	An independent non-executive director should be appointed to board committees.	1 if the nomination committee has an independent director, otherwise 0.	BoardEx
9	Terms of Reference: Nomination Committee	The nomination report should be included if there is no separate nomination committee, there should be an explanation of the processes by which the whole board determines nomination and senior appointment matters.	1 if the firm has a nomination report, otherwise 0.	Annual Report
10	Other Committee	Although the audit, remuneration and nomination committees are the main committees, the firm can have additional committees.	1 if the firm has committees other than those mentioned above, otherwise 0.	BoardEx
C	**Board Transparency**			
1	Summary of Vision and Strategy	There should be a clear articulation of the strategy of the firm.	1 if the firm has a strategic report, otherwise 0.	Annual Report
2	Chairman's Report	The narrative reporting of the firm should include a report by the chairman of how the QCA Code is applied and how such application supports the firm's long-term success and its strategy for growth.	1 if the firm has a chairman's governance report, otherwise 0.	Annual Report
3	Risk Management and Internal Control	There should be a summary of the systems of risk management and internal control and the uncertainties facing the business.	1 if the firm has a risk management and internal control statement, otherwise 0.	Annual Report
4	Board of Directors' Biographies	There should be a summary of information (Profile and Names) about the chairman, chief executive, if applicable, the senior independent director, and other directors on the board and individual committees.	1 if the firm has a list of its board of directors' names and profiles, otherwise 0.	Annual Report

5	Directors' Report	Companies should set out in the annual report good explanations of the qualities, skills and experience of each director, including an assessment of independence and a statement of the relevant skills and experience that each director brings to the board.	1 if the firm has a directors' report, otherwise 0.	Annual Report
6	Directors' Responsibilities Statement	Every director must be able to effectively communicate the firm's approach to corporate governance to its shareholders and to the market, including the firm's strategy.	1 if the firm has a statement of directors' responsibilities, otherwise 0.	Annual Report
7	Performance Evaluation	There should be a description of the performance evaluation from previous years.	1 if the firm has a statement of its previous performance, otherwise 0.	Annual Report
8	Role of External and Internal Advisers	There should be an explanation of the role of any external advisers to the board or its committees and any internal advisory responsibilities.	1 if the firm has an independent auditor's report, otherwise 0.	Annual Report
9	Corporate Governance Statement	A firm's annual corporate governance statement should explain how that firm achieves good governance and the challenges it faces in so doing.	1 if the firm has a statement of corporate governance, otherwise 0.	Annual Report
10	Published Material	The annual report and other governance-related material should be contained on the website, including notices of all general meetings over the last three years.	1 if the firm publishes its annual report on its website, otherwise 0.	Annual Report
11	Meetings and Attendance Records of the Board	There should be disclosure of the number of meetings during the year of the whole board.	1 if the firm has a meetings record for the board, otherwise 0.	Annual Report
12	Meetings and Attendance Records of the Board Committees	There should be disclosure of the number of meetings during the year of the board committees.	1 if the firm has a meetings record for the board committees, otherwise 0.	Annual Report
13	Statement of Appointment of Directors	The terms and conditions of appointment of the board of directors should be stated.	1 if the firm has an appointment statement for its directors, otherwise 0.	Annual Report
14	Relationship with Shareholders	An effective board regularly informs and engages with shareholders.	1 if the firm explains the channels through which shareholders can communicate with the firm, otherwise 0.	Annual Report

15	Results of Shareholder Voting	Voting decisions should be posted on the firm's website. Where votes at an AGM are by show of hands, the votes by proxy received by the firm should be recorded.	1 if the firm has a report of its AGM, otherwise 0.	Annual Report
16	Related Party Transactions	An AIM firm must report any transaction with a related party without delay.	1 if the firm discloses its related party transactions, otherwise 0.	Annual Report
D	**Remuneration Policy Structure**			
1	Base Salary	Details of all directors' remuneration should be clearly disclosed, such as base salary, bonus, pension, etc.	1 if the base salary is disclosed for directors, otherwise 0.	BoardEx
2	Bonus	Details of all directors' remuneration should be clearly disclosed, such as base salary, bonus, pension, etc.	1 if the bonus is disclosed for directors, otherwise 0.	BoardEx
3	Pension	Details of all directors' remuneration should be clearly disclosed, such as base salary, bonus, pension, etc.	1 if the pension is disclosed for directors, otherwise 0.	BoardEx
4	Long-Term Incentive Plans (LTIPs)	Details of all directors' remuneration should be clearly disclosed, such as base salary, bonus, pension, etc.	1 if the LTIPs are disclosed for directors, otherwise 0.	BoardEx
5	Share Options	Details of all directors' remuneration should be clearly disclosed, such as base salary, bonus, pension, etc.	1 if the share options are disclosed for directors, otherwise 0.	BoardEx
6	Share Ownership	Details of all directors' remuneration should be clearly disclosed, such as base salary, bonus, pension, etc.	1 if the share ownership is disclosed for directors, otherwise 0.	BoardEx
7	Other Remuneration Schemes	Details of all directors' remuneration should be clearly disclosed, such as base salary, bonus, pension, etc.	1 if the firm has other disclosed remuneration schemes, otherwise 0.	BoardEx
Maximum Score			**40**	

4.3.3 Ownership Structure Variables

The second main independent variable of this thesis is the ownership structures. The current study examines various ownership structures on stock liquidity. These include insider ownership, institutional ownership, number of institutions, significant ownership, substantial ownership and minority shareholders. More detailed information about these ownership structures and their associations with stock liquidity are provided and discussed in Section 3.3.2. Nevertheless, for the purposes of coherence, the definitions of these variables are briefly explained once again as follows:

- **Insider ownership (IO)** is defined as the percentage of shares held by both executive and non-executive members of the board (Fidrmuc et al., 2006, Iskandrani et al., 2015, Weir et al., 2002).
- **Institutional ownership (ITO)** is defined as the percentage of shares held by institutional shareholders.
- **Number of institutions (NITO)** is defined as the number of institutional shareholders in a certain firm.
- **Ownership concentration** reflects the level of large shareholders concentrated in the firm. There are two types of control ownership in focus in the AIM Rules for Companies. The first ownership type is **significant ownership (SGO)**, which refers to any identity that holds 3% or more of the firm's shares. The second ownership is **substantial ownership (SUBO)**, which is defined as any identity that holds 10% or more of the firm's shares.
- **Minority shareholders (MINO)** are defined as the percentage of shares held by small shareholders, who hold less than 3% of a firm's shares.

4.3.4 Ownership Identity Variables

The last main independent factor of stock liquidity being examined is ownership identities. This study focuses on a number of ownership identities, i.e. free float ownership, investment bank ownership, foreign ownership, government ownership, pension fund ownership, employee ownership, cross-holding ownership and other-holding ownership in order to examine the effect of ownership identity on stock liquidity. This section will briefly explain these variables. Nevertheless, Section 3.3.3 provides readers with more comprehensive

information about these ownership identities and their impacts on stock liquidity as described in the empirical literature.

- **Free float ownership (FFO)** is defined as the percentage of total shares held by outsider shareholders. It is worth noting that shares held by strategic shareholders, e.g. insider ownership and government ownership are excluded from this ownership identity.
- **Investment bank ownership (IBO)** is defined as the percentage of total shares held by investment banks that hold at least 5% of a firm's shares.
- **Foreign ownership (FOO)** is defined as the percentage of total shares held by foreign investors who hold at least 5% of a firm's shares.
- **Government ownership (GO)** is defined as the percentage of total shares held by governments that hold at least 5% of a firm's shares.
- **Pension fund ownership (PFO)** is defined as the percentage of total shares held by pension funds that hold at least 5% of a firm's shares.
- **Employee ownership (EO)** is defined as the percentage of total shares held by firms' employees who hold at least 5% of the firms' shares.
- **Cross-holding ownership (CHO)** is defined as the percentage of total shares held by other publicly traded corporations that hold at least 5% of a firm's shares.
- **Other-holding ownership (OHO)** is defined as the percentage of total shares held by any other investors not listed above that hold at least 5% of a firm's shares.

4.3.5 Accounting and Market Variables

In addition to the previously mentioned main explanatory variables, this study also employs other variables that have been documented to have potential impacts on stock liquidity. By controlling for those factors, the statistical estimation models can be more robust, as confounding effects are accounted for. A number of accounting and market factors are employed as controlling variables in this study. These include share price, return volatility, firm size, financial leverage, firm age, asset tangibility, and research and development expenditure. The definitions of these variables are provided below:

- **Share price (SHP)** is the daily average closing price. In order to address the impacts of tick-size-induced binding constraints, this study employs the reversed function of share price, i.e. $\frac{1}{share\ price}$ (e.g., Chung et al., 2010, Ali et al., 2017, Al-Jaifi et al., 2017). Share

price can control for the effect of discreteness, i.e., it can be used as a proxy for risk. Thus, lower share price tends to be risker (Stoll, 2000). As share price has been found to be negatively related to the bid–ask spread, higher share prices are likely to be associated with increased stock liquidity (Jegadeesh and Subrahmanyam, 1993, Amihud and Mendelson, 1986).

- **Return volatility (RV)** is measured by standard deviation of daily returns. Regarding the relationship between return volatility and stock liquidity, the literature indicates that more volatile stock leads to more uncertain costs among stock holders, and higher inventory risks are imposed by market makers on informed traders due to increased information asymmetry, which can cause a higher bid–ask spread, i.e. lower stock liquidity (Jegadeesh and Subrahmanyam, 1993). In detail, more volatile stock may give an indication to the market makers that these stocks may involve private information. This may lead them to increase the transaction cost, i.e., inventory cost, for the informed traders. This can reduce stock liquidity. Besides this, higher volatility leads to higher uncertainty (Stoll, 2000) and therefore higher information asymmetry (Dierkens, 1991).
- **Firm size (SIZE)** is defined as the natural logarithm of share price multiplied by total number of outstanding shares. Commonly, large firms tend to have higher stock liquidity compared to smaller firms. This may be because the former often disclose more public information, which in turn reduces information asymmetry and increases stock liquidity (Stoll, 2000). Besides this, large firms tend to have higher shareholder bases compared to small firms. Thus, it is expected that trading activity of large firms to be greater than those small firms.
- **Financial leverage (LV)** is defined as the proportion of total liabilities to total assets. Commonly, firms with more stock liquidity mostly have lower costs for equity issuance. This in turn makes debt financing less attractive than equity financing. Thus, firms with high stock liquidity have lower financial leverage (Nadarajah et al., 2018). This was also confirmed by Fang et al. (2009), who argued that firms characterised by high stock liquidity tend to have less financial leverage in their capital structure and a higher fraction of equity. Given these arguments, it is expected that firms with low financial leverage will have higher stock liquidity.
- **Firm age (AGE)** is defined as the natural logarithm of the number of listed years of firms. Commonly, older firms have a larger shareholder base compared with younger listed firms. Therefore, the former have more stock liquidity (Ding and Hou, 2015). Besides this, older

firms usually have lower asymmetric information between insiders and outsiders, as their stocks have been traded on the market for a longer period of time (Iskandrani et al., 2015).

- **Asset tangibility (AT)** is defined as the ratio of net equipment, plant and property to total assets. Regarding the relationship between asset tangibility and stock liquidity, the literature argues that asset tangibility reduces asymmetric information problems because tangible assets' payoffs are easier to measure (Chung et al., 2010). This in turn may improve stock liquidity by reducing the chances for informed traders to trade based on non-public information. Besides this, the positive relationship may also due to the fact that more asset-tangible firms are of a higher relative size and, hence, more liquid.
- **Analyst Following:** analysts aim to gather information of firms that they follow, from private and public sources, to assess the firms' current performance, as well as making forecasts and predictions on the firms' future performances. Besides this, they tend to also make recommendations for shareholders to sell, hold or buy the firm's stocks (Healy and Palepu, 2001). Indeed, financial analysts are able to engage in the production of non-public information to disclose superior and/or private information held by the managers (Healy and Palepu, 2001). As noted by Lang and Lundholm (1993) and Kini and Mian (1995), analysts tend to follow firms with greater institutional ownership. Thus, more public information about these firms is disseminated. As a result, the problem of information asymmetry is lessened, leading to lower bid–ask spread.
- **Research and development (R&D) expenditure** is defined as the expenditure on research and development divided by sales. Unlike tangible assets, the payoffs from research and development expenditure are more difficult to identify. As a result, it can worsen informational asymmetry problems, decreasing stock liquidity (Chung et al., 2010). Besides this, the negative relationship may also due to the fact that high- R&D expenditure firms are of lower relative size and, hence, less liquid.
- **Industry and year fixed effects** are controlled for to tackle the exclusive effects of time factors (e.g. cross-sectional dependence and market-wide factors) and industry-level factors on stock liquidity (Poon et al., 2013). As mentioned in Section 4.2, the studies of this thesis are conducted on nine non-financial sectors of the AIM across a seven-year period from 2010 to 2016. Therefore, the inclusion of year and industry dummy variables is important for the development of a robust estimation model.

Table 4. 4 Measures and Data Sources of Stock Liquidity, Corporate Governance Quality, Ownership Structure, Ownership Identity and Control Variables

Variables	Definitions	Data Sources
Dependent variables		
Quoted bid–ask spread (QBAS)	QBAS = ask price – bid price / midpoint price, which is calculated as (ask + bid) / 2.	Own calculation
Price impact ratio (PIR)	PIR = stock return / trading volume.	Own calculation
Turnover ratio (TR)	TR = trading volume / number of outstanding shares.	Own calculation
Trading volume (TV)	TV is the number of shares traded for a stock on a particular day in thousands.	Datastream
Number of trades (NT)	NT is the total number of times shares were traded in one day.	Datastream
Trade Size (TS)	TS = trading volume / number of trades.	Own calculation
Independent variables		
Corporate governance quality index (CGQIAIM)	The CGQIAIM contains 40 governance variables.	Annual report & BoardEx
Information disclosure (ID)	ID is the number of regulatory announcements released by AIM firms.	AIM firms' websites
Insider ownership (IO)	IO is the percentage of shares held by executive and non-executive members.	Bloomberg
Institutional ownership (ITO)	ITO is the percentage of shares held by institutional investors.	Bloomberg
Number of institutions (NITO)	NITO is the number of institutions that hold shares in a stock at the end of the fiscal year.	Bloomberg
Significant ownership (SGO)	SGO is any identity (blockholder) that holds 3% or more of a firm's shares.	Fame
Substantial ownership (SUBO)	SUBO is any identity (large shareholder) that holds 10% or more of a firm's shares.	Fame
Minority shareholders (MINO)	MINO is any identity that holds less than 3% of a firm's shares.	Fame
Free float ownership (FFO)	FFO is the percentage of total shares held by outside investors.	Datastream
Foreign ownership (FOO)	FOO is foreign ownership holding 5% or more of a firm's outstanding shares.	Datastream
Investment Bank ownership (IBO)	IBO is investment bank ownership holding 5% or more of a firm's outstanding shares.	Datastream
Government ownership (GO)	GO is government ownership holding 5% or more of a firm's outstanding shares.	Datastream
Pension fund ownership (PFO)	PFO is pension fund ownership holding 5% or more of a firm's outstanding shares.	Datastream
Employee ownership (EO)	EO is employee ownership working inside a firm and holding 5% or more of the firm's outstanding shares.	Datastream

Cross-holding ownership (CHO)	CHO is a situation where one firm owns shares in another firm. This variable is defined as cross-holding ownership, holding 5% or more of a firm's outstanding shares.	Datastream
Other-holding ownership (OHO)	OHO is other-holding ownership holding 5% or more of a firm's outstanding shares. This ownership can be any type of ownership outside the above-mentioned categories.	Datastream
Control variables		
Share price (SHP)	SHP is the closing price of a stock.	Datastream
Return volatility (RV)	RV is the standard deviation of stock return.	Own calculation
Firm size (SIZE)	SIZE is market capitalisation, which is measured as share price multiplied by total number of outstanding shares.	Datastream
Financial leverage (LV)	LV is the proportion of total liabilities to total assets.	Datastream
Firm age (AGE)	AGE is the number of years since the firm was first listed on the market.	AIM firms' websites
Asset tangibility (AT)	AT is the ratio of net equipment, plant and property to total assets.	Datastream
Research and development expenditure (R&D)	R&D is the expenditure on research and development divided by sales.	Datastream
Analyst following (AF)	AF is the number of analysts who follow or observe a firm.	Bloomberg

4.4 Research Methodology

Previous sections of this chapter have introduced, explained and discussed the data sample and all factors being employed in this thesis to achieve the research objectives. Moving on to a more quantitative focus, this section aims at providing comprehensive information about the baseline statistical method, the procedure and the justifications for any choices made as part of the process.

Before proceeding to the methodology of the study, it is worth briefly discussing the nature of the data sample. This study employs panel data, i.e., an unbalanced panel to examine the impacts of corporate governance quality, ownership structure and ownership identity on stock liquidity. Panel data has been increasingly adopted in the financial literature, particularly when discussing the topic of corporate governance. As it combines the natures and advantages of both time-series and cross-sectional data (Hsiao, 2007), this type of data is efficient and suitable for studying the dynamics of change and complex behavioural models by providing more variability, and informative data. Furthermore, it helps in controlling for any unobserved unit-

level factors that may be associated with explanatory variables, as well as any heterogeneity among variables (Grieser and Hadlock, 2019). It has also been argued that employing panel data can reduce problems related to unobserved and missing variables, as well as decreasing bias in the investigations (Hsiao, 2007). Moving on to the subsequent section, the estimation method employed in this thesis will be introduced and discussed.

4.4.1 Estimation Method

From a review of the estimation methods employed by prior studies in the literature, it is evident that the majority of studies employ either ordinary least squares (OLS) or the fixed effect.[34] Despite the popularity and widespread use of these methods in corporate governance research, this study adopts the dynamic system generalized method of moments (GMM)[35] to examine the impacts of corporate governance quality, ownership structure and identity on stock liquidity. More justification of the use of GMM will be discussed later in Section 4.4.2. In particular, this study applies two-step GMM dynamic panel estimator. The two-step system GMM is the augmented standard GMM (the difference GMM),[36] more robust to one-step system GMM and more robust and efficient to autocorrelation and heteroscedasticity (Roodman, 2009). This section will discuss two points: how system GMM works and the empirical models employing in this thesis.

How System GMM Works

To understand how system GMM works, two significant steps are required[37]. ***The first step*** is to write a general dynamic model in first-differenced form:

$$\Delta Y_{it} = \alpha + k_g \sum \Delta Y_{it-g} + \beta \Delta X_{it} + \gamma \Delta C_{it} + \Delta \varepsilon_{it}, \qquad g > 0, k > g \tag{4.1}$$

Where, y represents stock liquidity variables, either informational or real friction variables. X represents the independent variables, either corporate governance quality, ownership structure

[34] See for example (Barabanov and McNamara, 2002, Chung et al., 2010, Comerton-Forde and Rydge, 2006, Ginglinger and Hamon, 2012, Iskandrani et al., 2015, Jacoby and Zheng, 2010, Karmani and Ajina, 2012, Kini and Mian, 1995, Lei et al., 2013, Næs, 2004, Poon et al., 2013, Prommin et al., 2014, Rubin, 2007, Sarin et al., 2000).

[35] The dynamic panel GMM estimation was initially established by Holtz-Eakin et al. (1988) and Arellano and Bond (1991). This estimation was then further developed by Arellano and Bover (1995) and Blundell and Bond (1998).

[36] The major concern of the standard GMM is that those historical variables, which are in levels, may be weak instruments (Arellano and Bover, 1995, Blundell and Bond, 1998).

[37] This methodology part is taken from Wintoki et al. (2012, pp. 587-588).

or ownership identity. C represents the control variables and G represents the number of lags. Full definitions of these variables can be seen in Table 4.3. According to Wintoki et al. (2012), first-differencing (Model 4.1) removes any possible bias that might arise from unobserved heterogeneity. In addition, the model employs the historical values of stock liquidity, the independent variables either corporate governance quality, ownership structure or ownership identity and the firm-specific variables as instruments for the current changes in these variables.

An important aspect of the first-difference transformation (Model 4.1) is that the instruments will be taken from the set of historical values of the dependent, independent and control variables. In other words, $Y_{t-k,} X_{t-k,} C_{t-k,}$ where k > g. In order to say that our instruments are valid, Wintoki et al. (2012, p. 588) emphasise that two criteria must be met. First, the instruments "must provide a source of variation for current" independent variables, either corporate governance quality, ownership structure or ownership identity. That is $X_t = f(Y_{t-k,} X_{t-k,} C_{t-k})$. For this assumption, this study empirically shows that corporate governance quality, ownership structure and ownership identity are strongly associated with historical values of stock liquidity and other explanatory variables (See Appendix).

Second, the historical values of these variables "must provide an *exogenous* source of variation for current" independent variables, either corporate governance quality, ownership structure or ownership identity. In other words, these lagged values must have no correlation with the error term. Thus, to capture the impact of historical values of stock liquidity on the current values of stock liquidity, lags values are included. These lagged values can control for dynamic endogeneity in the model. Besides this, the firm's history beyond these lagged values should be exogenous variables. Arellano and Bond (1991) and Wintoki et al. (2012) suggest two tests for the validity of these lags values: "second order serial correlation and Hansen test of over identification" (More explanations for these tests will be discussed later in Section 4.4.2).

Nevertheless, the first-differencing (Model 4.1) still bears some econometric shortcomings, e.g. Beck et al. (2000) indicate that variables in differences maintain a weaker association with their instruments than variables in levels because variables in differences are less serially correlated than in levels. Thus, ***the second step*** is to include the equations in levels in the estimation to reduce these weaknesses. In other words, the first-differenced variables are employed as instruments for the equations in levels. This step produces the system GMM.

$$\begin{bmatrix} Y_{it} \\ \Delta Y_{it} \end{bmatrix} = \alpha + \kappa \begin{bmatrix} Y_{it-g} \\ \Delta Y_{it-g} \end{bmatrix} + \beta \begin{bmatrix} X_{it} \\ \Delta X_{it} \end{bmatrix} + \gamma \begin{bmatrix} C_{it} \\ \Delta C_{it} \end{bmatrix} + \varepsilon_{it} \quad (4.2)$$

Roodman (2009) also indicates that system GMM is deemed to be more efficient than first-difference GMM, as additional instrumental variables are employed in levels to enhance the model's efficiency. Finally, Model 4.2 still includes unobserved heterogeneity. To reduce this problem, Wintoki et al. (2012) assume that the independent and control variables are constantly correlated with the unobserved effects over time. Thus, system GMM helps to obtain efficient estimates by controlling for simultaneity, unobserved heterogeneity and the dynamic association between current explanatory variables and the historical values of the dependent variables (Wintoki et al., 2012, Akbar et al., 2017).

Empirical Models

As discussed above that system GMM estimator has been supported, and its use encouraged, by previous studies, e.g. Wintoki et al. (2012) and Akbar et al. (2017). The general model employed throughout this thesis can be written as follows:

Stock liquidity = *f* (lagged stock liquidity, main independent variables, controlling variables)

As the general model illustrates, lagged dependent variables (stock liquidity) are included as explanatory variables to capture any potential impacts of past stock liquidity on current corporate governance, ownership structure, ownership identity and characteristics of the firm. In this regard, Rhee and Wang (2009) and Tran et al. (2018) argue that past stock liquidity can be associated with current liquidity and current ownership. Thus, they added lags of stock liquidity in their model. Agarwal (2009) also found that past stock liquidity affects short-term institutional ownership, but not long-term institutions. Furthermore, a positive association between past stock liquidity and current ownership was found by (Gompers and Metrick, 2001, Falkenstein, 1996). Thus, ignoring the dynamic effect on the association between current independent variable and past dependent variable may lead to inconsistent estimates (Wintoki et al., 2012, Wooldridge, 2002).

Nevertheless, it is an important task to determine the number of lagged variables to be employed as explanatory variables in the model. Following the study of Akbar et al. (2017), each current stock liquidity variable regresses on three lags of past stock liquidity in addition to the characteristics of firms that are employed as control variables. Accordingly, the

following model –preliminary test– is applied to determine the suitable number of lags that should be added in the study models:

$$LIQUI_{it} = \alpha_1 + \sum_{g=1}^{g=3} \kappa_g LIQUI_{it-g} + \kappa C_{it} + \eta_i + \varepsilon_{it} \tag{4.3}$$

Where $LIQUI_{it}$ represents current stock liquidity variables, $LIQUI_{it-g}$, represents the three lags values of stock liquidity variables, C_{it} represents the control variables of this study, μi represents the unobserved fixed effect, and ε_{it} represents the error term.

In detail, in cases where all three lags of stock liquidity are significant, including them as explanatory variables in the model will be enough to capture the past impact. If two lags of stock liquidity are significant, including these two lags in the model will be enough to capture all the dynamic impact estimated by GMM, and therefore lag three will be exogenous and can be employed as instruments. If only one lag of stock liquidity is significant, including it in the model will be enough to capture the past impact and therefore lags two and beyond will be exogenous and can be employed as instruments.

Thus, to properly employ the system GMM, this study follows the studies of Wintoki et al. (2012) and Akbar et al. (2017), and employs two important steps: (1) the statistically significant variables of past stock liquidity are employed in the model as explanatory variables. See for example (Akbar et al., 2017, p. 106), and (2) the independent variables, either corporate governance quality, ownership structure or ownership identity and firm characteristics are used as endogenous variables, whereas firm age and year dummies are exogenous variables (see, Wintoki et al., 2012, p. 596, Akbar et al., 2017, p. 106).

Given the above, the three models presented below investigate the impacts of corporate governance quality on stock liquidity, ownership structure on stock liquidity and ownership identity on stock liquidity respectively.

$$LIQUI_{it} = \alpha + \kappa_g \sum LIQUI_{it-g} + \beta CGQIAIM_{it} + \gamma C_{it} + \theta X_{it} + \mu i + \varepsilon_{it} \tag{4.4}$$

$$LIQUI_{it} = \alpha + \kappa_g \sum LIQUI_{it-g} + \beta Ownership_{it} + \gamma C_{it} + \theta X_{it} + \mu i + \varepsilon_{it} \tag{4.5}$$

$$LIQUI_{it} = \alpha + \kappa_g \sum LIQUI_{it-g} + \beta Identity_{it} + \gamma C_{it} + \theta X_{it} + \mu i + \varepsilon_{it} \tag{4.6}$$

Where $LIQUI_{it}$ represents current stock liquidity variables, $LIQUI_{it-g}$ represents the lags values of stock liquidity variables determined by the preliminary test (Model 4.3). C_{it} represents the control variables of this study. In particular, share price, return volatility, firm size, firm age, research and development expenditure, asset tangibility, leverage and trading volume are the control variables for Model 4.4, whereas share price, return volatility, firm size, leverage and firm age are the control variables for Models 4.5 and 4.6. $CGQIAIM_{it}$ represents the corporate governance quality index in Model 4.2, $Ownership_{it}$ represents the ownership structure variables (insider ownership, institutional ownership, ownership concentration and minority shareholders) in Model 4.3, and $Identity_{it}$ represents the ownership identity variables (free float ownership, investment bank ownership, foreign ownership, government ownership, pension fund ownership, employee ownership, cross-holding ownership and other-holding ownership) in Model (4.4). X_{it} is the exogenous variables, which include firm age and year dummies. Mi represents the unobserved fixed effect, and E_{it} represents the error term.

4.4.2 Econometric Issues: Why GMM?

Whilst acknowledging that the majority of previous studies on similar topics have employed the OLS or the fixed effect model, this study employs the system GMM as the main estimation model. The reasons for this decision lie primarily in the econometric issues exposed to the panel data employed within corporate governance studies. The key issue that the GMM aims to address is the ***endogeneity*** problems. Previous studies in the literature have argued that corporate governance[38] and ownership structure[39] are likely to be endogenously determined. Hence, endogeneity is considered the most crucial concern in these studies as it may lead to inconsistent and biased estimators (Wintoki et al., 2012, Roberts and Whited, 2012). Nevertheless, although academic researchers in this field have well acknowledged the issue, it has not received sufficient and proper treatment in most of the previous studies (Wintoki et al., 2012).

Wintoki et al. (2012) indicate that the problems of endogeneity can emerge from three different sources: (1) unobservable heterogeneity; (2) simultaneity, and (3) dynamic endogeneity. First, unobservable heterogeneity can occur as a result of the existence of unmeasurable or unobservable factors, which are correlated with dependent and explanatory variables. Second,

[38] (e.g., Ali et al., 2017, Hermalin and Weisbach, 2003, Wintoki et al., 2012, Lei et al., 2013, Prommin et al., 2014).
[39] (e.g., Ajina et al., 2015, Heflin and Shaw, 2000, Poon et al., 2013, Rubin, 2007, Brockman et al., 2009, Comerton-Forde and Rydge, 2006).

simultaneity can occur when there is a reversed causal relationship between the independent and the dependent variables. In other words, "the independent variables are a function of the dependent variable or expected values of the dependent variable" (Wintoki et al., 2012, p. 603). Finally, dynamic endogeneity can occur due to associations between independent variables and lagged dependent variables, which can lead to inconsistent parameters (Wintoki et al., 2012). Consequently, with the aim of dealing with these issues as the priority, this study employs the system GMM as recommended by recent studies, e.g., Wintoki et al. (2012) and Akbar et al. (2017).

Wintoki et al. (2012) state three main mechanisms of dynamic GMM, which can tackle the endogeneity problems and which do not exist in the OLS and fixed effect methods. First, the system GMM allows for firm fixed effects in the model to control for unobservable heterogeneity. Second, by employing the lagged dependent variables as instrumental variables, the model allows for the correlation between independent variables and lagged dependent variables. Third, the inclusion of internal instrumental variables can help to account for the problem of simultaneity (Wintoki et al., 2012). In general, system GMM exploits the dynamic associations inherent in the explanatory variables, as well as solving the dynamic problems between explanatory and dependent variables (Wintoki et al., 2012).

In addition, Akbar et al. (2017) argue that if the model is dynamic, the past value of dependent variables can be associated with firm fixed effects. This in turn can bias the estimation of the OLS. Although the impact of the firm fixed effects can be removed by applying the fixed effect model, the transformation to remove the firm fixed effects can still present associations between the transformed error term and the transformed past value of a dependent variable. In addition, if the explanatory variables are endogenous, the error term can be associated with the explanatory variables, and therefore both OLS and fixed effect estimators can give inconsistent results. They also argue that, "A solution to overcome these econometric problems is the application of a dynamic panel generalized method of moments estimator (system-GMM) which can also eliminate the fixed effects by a first-differences transformation and correcting for the aforementioned bias (Arellano and Bond, 1991)" (Akbar et al., 2017, p. 105). [40]

40 For the robustness check, we first check whether dynamic endogeneity exists in our models by examining the effects of past stock liquidity and past financial characteristics of firms on current corporate governance quality, ownership structure and ownership identity, as suggested by Wintoki et al. (2012) (further details are provided in Appendix A). In addition, we re-ran the baseline model using OLS to determine whether or not the GMM results are similar to the OLS (more details are provided in Appendix B).

In addition to the endogeneity problems, the OLS and fixed effect methods do not have any specification tests to examine the model validity, whereas the GMM has four tests to do so (Wintoki et al., 2012, Arellano and Bond, 1991). These tests are the first serial correlation, second serial correlation, Hansen test and differences in Hansen test. Specifically, the serial correlation is deemed to exist if a serial correlation of the first difference AR(1) is obtained, in combination with a nonsignificant serial correlation of the second difference AR(2). Regarding the last two tests, nonsignificant results indicate that the instrumental variables employed are valid. Therefore, as the study employs the GMM, all these tests will also be performed to ensure the validity of the models as a whole.

To sum up, given the issues of coverage of the system GMM compared to the OLS and the fixed effect estimates, and the availability of validity tests, the study employs the system GMM as a robust method to examine the research aims.

Besides this, the current study also attempts to tackle other general issues in the data, such as **outliers,** by winsorising all continuous variables below 1% and above 99%. It is an important decision to make, as the ignorance of outliers in the data might lead to biased parameters and a decrease in the model significance levels (Gujarati, 2004).

Another econometric concern to be discussed is **multicollinearity**, which occurs as a result of strong and significant correlations among independent variables (Gujarati, 2004, p. 342). Although the problem of multicollinearity does not lead to biased estimators, the findings can be inconsistent, with undetermined parameters and infinite errors (Gujarati, 2004). Therefore, the issues will be detected by two common tests, the Pearson Correlation Coefficient and the Variance Inflation Factors (VIF), as suggested by prior studies (Poon et al., 2013, Iskandrani et al., 2015). The correlation test is primarily used to identify the existence of high multicollinearity among explanatory variables. In particular, if there is a strong relationship between two explanatory variables, the coefficients of the regression are inconsistent and their errors are infinite (Gujarati, 2004). Specifically, if the correlation between two independent variables is more than 80%, multicollinearity is deemed to exist (Gujarati, 2004). In addition to this bivariate test, the VIF is considered another common test employed to detect multicollinearity problems. This test requires that the VIF value should not be more than 10 in order to say that there is no multicollinearity among explanatory variables. In other words, the R^2 should not exceed 90% (Gujarati, 2004). The VIF is calculated as follows:

$$\text{VIF} = \frac{1}{\text{Tolerance}}$$

Where the *Tolerance = 1- R^2*, and R^2 is the determinations coefficient.

Moreover, the panel data is further exposed to **heteroscedasticity and serial correlation** due to its time-series and cross-sectional components. Just as importantly, these problems should be properly addressed to ensure the robustness of the model, as they may lead to inefficient predictions, misleading inferences and inefficient parameter estimates (King and Evans, 1984). A common resolution recommended by the literature for these issues is the cluster robust estimator (Arellano, 1987, Hoechle, 2007), which will be employed in this study. This study uses Stata 14 software in order to detect and solve such econometric issues.

4.5 Summary

The current chapter has explained and discussed the sources of data collection, data sample, definitions and measures of all variables, as well as the research methods employed in this thesis. Additionally, the chapter has also provided thorough justifications for all decisions made as part of the process. In particular, the data is collected manually from firms' websites and annual reports as well as from databases such as Datastream, BoardEx, Bloomberg and Fame. The final sample of this study comprises non-financial firms listed in the FTSE AIM All-Share Index covering a seven-year period from 2010 to 2016. Subsequently, this chapter has described and defined all variables used in the analysis of this study. These are corporate governance quality, ownership structure, ownership identity, stock liquidity and accounting and market variables. Regarding quantitative analysis, the study employs panel data that comprises both time-series and cross-sectional components. Furthermore, system GMM is employed as the baseline estimation model instead of other commonly used conventional methods such as the OLS and the fixed effect methods. The main reason for this decision is that the GMM can tackle the endogeneity problems of unobservable heterogeneity, simultaneity and dynamic endogeneity.

Throughout the preceding four chapters, the reader has been provided with basic information regarding the objectives, aims, theoretical foundation, empirical literature review, and research methods of this thesis. These pieces of information will be useful when progressing to the next three empirical chapters, where the results and findings of the analysis will be obtained and

discussed. It is worth mentioning that Stata 14 software is employed for the three regression models.

Chapter 5 Corporate Governance Quality and Stock Liquidity

5.1 Introduction

Agency conflicts are perceptible in numerous forms, such as self-serving behaviours of managers, excessive consumption of perquisites, and non-optimal decision making in investment and other corporate financial matters, to mention a few. Since agency conflicts can damage firms' operations, performances and competitive advantages in the markets, various corporate control and monitoring mechanisms are designed to minimise agency divergence. Among these, the enforcement of corporate governance practice is a widely used approach in enhancing management oversight and developing firms' enviable incentive structures.

The literature has suggested the roles of internal corporate governance mechanisms in mitigating agency costs. For example, Denis (2001) and Shleifer & Vishny (1997) state that effective governance mechanisms are required to reduce agency conflicts between the manager and shareholders, through the improvement of information disclosure and transparency of firms (Ali et al., 2017). It was also found that firms with weak corporate governance mechanisms often exhibit high agency problems (Yuan et al., 2009), and therefore perform worse (Core et al., 1999). Building on agency theory, previous empirical studies have indicated that the quality of corporate governance plays an important role in enhancing stock liquidity through higher operational and financial transparency, and hence reduced asymmetric information between firm insiders and outside shareholders (e.g., Chung et al., 2010). It is noticeable that the topic has just recently received attention from academic researchers, and hence coverage remains limited. Furthermore, those limited studies were conducted in the US (Chung et al., 2010), Australia (Ali et al., 2017), France (Karmani and Ajina, 2012) and emerging stock markets such as Malaysia, China and Thailand (Foo and Zain, 2010, Lei et al., 2013, Prommin et al., 2014). To the best of my knowledge, the association between corporate governance quality and stock liquidity has not been examined in the UK market.

Therefore, contributing to the literature, the current study investigates this topic in the UK stock exchange, focusing on the AIM. This market was designed and developed by the LSE for small and growing firms, and is considered the most successful growth market in the world. This study employs a comprehensive set of different aspects of corporate governance, applying 40 governance standards distributed across four main categories: board composition; board committees; board transparency, and remuneration policy structure.

This chapter starts with the provision of the hypothesis development of the study. Subsequently, descriptive statistics will be provided and discussed. Following this, findings on the empirical analysis of the association between corporate governance quality and stock liquidity, as well as the robustness check, will be presented.

5.2 Hypothesis Development

To proceed to hypothesis development of this study, both theoretical and empirical studies on the linkages between corporate governance quality and stock liquidity are taken into account. To avoid repetition, detailed information was discussed in Section 3.2.3 for theoretical framework and Section 3.3.1 for the empirical literature.

In brief, according to agency theory, conflicts between firm managers and shareholders occur as a result of the separation of ownership from control through information asymmetry (Ali et al., 2017). Therefore, efficient corporate governance mechanisms, which act as control and monitoring centres, are encouraged to mitigate the conflicts and protect the rights of shareholders. Strong corporate governance can enhance the quality of information being disclosed as well as the transparency of firms' operations, leading to a decreased degree of asymmetric information. Consequently, the opportunities for informed traders to take advantage of their privileged private information in trading firms' shares diminish, causing lower bid–ask spreads, i.e. improved stock liquidity (Karmani and Ajina, 2012, Chung et al., 2010).

Following the theoretical argument of agency theory, a number of empirical studies have examined the impacts of corporate governance quality on stock liquidity (Chung et al., 2010, Ali et al., 2017, Al-Jaifi et al., 2017, Karmani and Ajina, 2012, Lei et al., 2013, Prommin et al., 2014). These studies have conducted their investigations on different markets worldwide with the use of different measures of corporate governance quality and stock liquidity as well as statistical methods. Nevertheless, virtually all of them consistently conclude that efficient corporate governance improves firms' stock liquidity. In other words, corporate governance quality is positively associated with stock liquidity. Consequently, the following hypothesis will be tested:

Hypothesis 1: Corporate governance quality is positively related to stock liquidity.

5.3 Descriptive Statistics

The sample employed in this study consists of firms listed on the FTSE AIM All-Share Index (excluding the financial sector) over a seven-year period from 2010 to 2016. The total sample being studied is 595 firms. Detailed information regarding the criteria of the sample are shown in Section 4.2. The current section aims at providing and discussing the descriptive statistics of the employed sample. To start with, the descriptive statistics of the components of corporate governance quality index, different stock liquidity measures, and controlling variables are summarised in Table 5.1. Subsequently, the average scores of the corporate governance quality index (CGQIAIM) across years and across industries are revealed in Tables 5.2 and 5.3, respectively.

As explained in Section 4.3.1 (summarised in Table 4.3), this study employs five measures of stock liquidity covering two dimensions of market frictions: (1) informational friction (including quoted bid-ask spread (QBAS) and price impact ratio (PIR)); and (2) real friction (including turnover ratio (TR), trade size (TS) and number of trades (NT)). Regarding the informational frictions, their average values and standard deviations (SD) are as follows: (1) QBAS has a mean of 7.6% and an SD of 6.7%, and (2) the mean and SD figures for PIR are 0.06% and 0.17%. Board et al. (2015) indicate that the AIM has greater bid–ask spread and higher price movements than the main market. They also find that the returns of AIM firms are higher than firms listed in the main market, which lead to higher price impact ratio.

With regard to the real friction variables, turnover ratio (TR), trade size (TS) and number of trades (NT) exhibit mean values of 0.25%, 35%, and 33.9, respectively; with SD of 0.31%, 48%, and 164, respectively. The differences in market real frictions are also reported by Board et al. (2015), who state that AIM firms have less trading volume and number of trades than main market firms. It is viable to obtain different distributions in these friction variables compared to those of the main market of the UK due to the natures of the firms listed in these two markets, particularly their sizes.

For the main explanatory variable of this study, the corporate governance quality index (CGQIAIM) contains 40 variables (see Section 4.3.2, Table 4.2). Its mean value is 27.83 with SD of 5.10, the minimum value is 8 and the maximum value is 38. Additionally, regarding the controlling variables employed, the minimum–maximum value of AIM firms' share price (SHP) is 0.26–1,482, with an average of 112.9 (in pence). Moreover, the average return

volatility (RV) of the AIM is 30.8% and its SD is 59.5%. Board et al. (2015) also report that the AIM is relatively riskier than the main market.[41] Besides this, the mean of the market value of equity (SIZE) is £61.66 (in millions) with an SD of 111.4.

The average age of an AIM firm (AGE) is 8.5 years, with the oldest firm having reached 21 years in operation. Board et al. (2015) indicate that the equity market value of the main market is larger than AIM firms, and the main market firms tend to be older than AIM firms. Furthermore, AIM firms spend on average 6.11% on research and development (R&D); the variable has an SD of 16.03% and a minimum–maximum value of 0%–66%. Asset tangibility ratio (AT) and Financial leverage (LV) have mean values of 17.45% and 59% respectively, with SD values of 23.9% and 353.42%. Finally, the trading volume of AIM firms on average is about 920,000 per year; the SD is 3,190 with maximum value of 24,980,000.

Table 5. 1 Descriptive Statistics

The table below presents the descriptive statistics of the empirical relationship between corporate governance quality and stock liquidity. QBAS, PIR, TR, TS and NT are the dependent variables; quoted bid–ask spread, price impact ratio, turnover ratio, trade size and number of trades respectively. CGQIAIM is the corporate governance quality index for the AIM. AF, SHP, RV, SIZE, AGE, R&D, AT, LV and TV are the control variables: share price, return volatility, firm size, firm age, research and development expenditure, asset tangibility, leverage and trading volume respectively. This table includes the means, medians, standard deviations, minimum, percentiles P25% and P75% and maximum values during the period from 2010 to 2016 for AIM firms.

Variable	Mean	Median	SD	Min	P25	P75	Max
QBAS (%)	7.689	5.613	6.749	0.276	3.399	9.689	46.02
PIR (%)	0.067	0.003	0.178	0.000	0.000	0.027	0.781
TR (%)	0.251	0.155	0.317	0.008	0.087	0.278	2.430
TS (%)	35.14	14.73	48.90	1.130	4.990	40.78	186.8
NT	33.95	7.796	164.1	1.000	3.630	19.82	5585
CGQIAIM	**27.83**	**28.00**	**5.100**	**8.000**	**25.00**	**32.00**	**38.00**
SHP (pence)	112.9	33.10	221.7	0.260	8.360	112.0	1482
RV (%)	30.89	8.450	59.57	0.130	2.410	24.93	248.6
SIZE (millions)	61.66	22.10	111.4	0. 520	7.460	60.74	720.4
AGE	8.530	8.000	4.260	1.000	5.000	11.00	21.00
R&D (%)	6.110	0.000	16.03	0.000	0.000	1.550	66.41
AT (%)	17.45	5.490	23.95	0.000	1.130	25.12	99.71
LV (%)	59.47	31.47	353.4	0.000	13.47	52.35	142.6
TV (thousands)	929.3	133.2	3190	1.500	38.22	428.6	24980

[41] The LSE (2016, p. 19) states that, "AIM is a market designed primarily for emerging or smaller companies to which a higher investment risk tends to be attached than to larger or more established companies".

Table 5.2 and Table 5.3 provide the average quality of AIM firms' corporate governance across the investigated period from 2010 to 2016, and across industries, respectively. Intriguingly, the index figures reveal a continuous increasing trend over time, from 26.69 in 2010 to 28.93 in 2016. This indicates that the quality of corporate governance of AIM firms has improved over the years (Figure 5.1). Finally, as revealed in Table 5.3, the Basic Materials sector exhibits the lowest values of the CGQIAIM, at 25.96, indicating its weaker corporate governance mechanisms compared to other industries. In contrast, the strongest quality of corporate governance ($\overline{\text{CGQIAIM}} = 29.32$) can be seen in firms operating in the Health Care industry.[42]

Table 5. 2 Means of the Corporate Government Quality Index for Each Year (2010–2016)

Variable	2010	2011	2012	2013	2014	2015	2016
CGQIAIM	**26.69**	27.07	27.28	27.68	28.18	28.53	**28.93**

Figure 5.1 Trends of Corporate Government Quality Index from 2010 to 2016

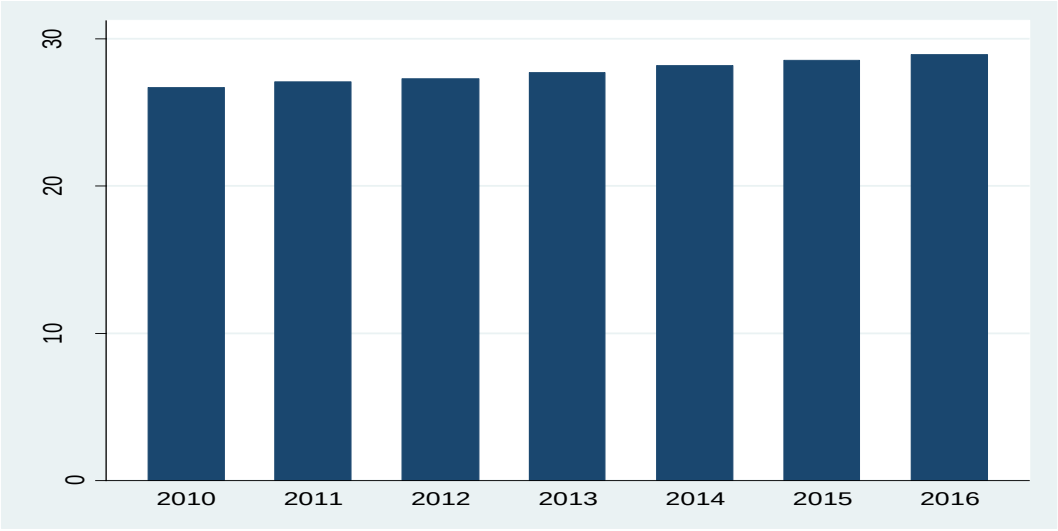


Table 5. 3 Means of the Corporate Government Quality Index for Each Industry

Variable	Basic Materials	Utilities	Telecommunications	Consumer Goods	Consumer Services	Health Care	Oil & Gas	Industrials	Technology
CGQIAIM	**25.96**	27.53	26.77	28.57	28.37	**29.32**	26.62	28.51	28.92

[42] A reason behind this may be the great investor performance of the Health Care industry in the AIM. For instance, over three years the Health Care sector has continued to overcome wider industries up to the end of 2017. In more detail, the performance of investors in the Health Care sector hit 82%, whereas the FTSE AIM All-Share index achieved 50%. See: LSE, https://www.lseg.com/resources/media-centre/press-releases/strength-uk-life-sciences-confirmed-future-healthcare-investor-forum

5.4 Correlation Matrix

As previously discussed in Section 4.4.2 regarding the multicollinearity issue, this section provides two common tests for this issue, namely correlation and VIF. Firstly, the correlation matrix is presented in Table 5.4 to reveal the correlation variables included in the studies, i.e. corporate governance quality, stock liquidity and controlling variables. Subsequently, Table 5.5 reveals the VIF for each variable in the model.

According to the correlation results (Table 5.4), the highest correlation obtained is between share price (SHP) and trading volume (TV) ($r \sim 0.67$, $p < 0.05$). This indicates that larger trading volume tends to exhibit a higher share price. The second highest correlation obtained is between share price (SHP) and firm size (SIZE) ($r \sim 0.56$, $p < 0.05$). This indicates that larger firms tend to exhibit higher share price. It is also worth mentioning that the correlation between corporate governance quality and firm size is 34%. This correlation indicates that firm size has a positive and significant association with corporate governance quality levels. That is, large firms have higher adoption levels and quality of corporate governance.

Nevertheless, as discussed in Section 4.4.2, the existence of multicollinearity can be confirmed if the correlation coefficient is higher than 80% between two independent variables. Consequently, correlation test cannot reject the null hypothesis that multicollinearity is present. This conclusion is confirmed by the VIF test presented in Table 5.5. All VIF values are below 10, indicating that there are no multicollinearity problems within the models.

Table 5. 4 Correlation Matrix for the Relationship between Corporate Government Quality and Stock Liquidity

	QBAS	PIR	TR	TS	NT	CGQIAIM	SHP	RV	SIZE	AGE	R&D	AT	LV	TV
QBAS	1.0000													
PIR	-0.2641*	1.0000												
TR	-0.1095*	-0.4773*	1.0000											
TS	0.3633*	-0.6631*	0.2584*	1.0000										
NT	-0.6076*	-0.2941*	0.5800*	-0.1069*	1.0000									
CGQIAIM	-0.3589*	0.1623*	-0.1148*	-0.1692*	0.1201*	1.0000								
SHP	-0.5503*	0.7347*	-0.2351*	-0.8886*	0.0889*	0.2759*	1.0000							
RV	-0.4009*	0.7279*	-0.1151*	-0.3277*	0.1160*	0.1565*	0.4313*	1.0000						
SIZE	-0.7600*	0.3275*	-0.1128*	-0.3325*	0.4568*	0.3414*	0.5650*	0.4136*	1.0000					
AGE	-0.0022	-0.0665*	-0.0294	-0.0123	0.0472*	0.1602*	-0.0584*	-0.0784*	-0.0309	1.0000				
R&D	-0.0547*	0.1290*	-0.1427*	-0.0674*	-0.0961*	0.1734*	0.1222*	0.0814*	0.1033*	0.0583*	1.0000			
AT	-0.2572*	0.2682*	-0.1980*	-0.2238*	0.0140	0.2134*	0.2900*	0.1983*	0.2708*	0.0240	0.0703*	1.0000		
LV	0.0182	0.1371*	-0.1320*	-0.0797*	-0.1646*	0.0934*	0.1008*	0.0002	0.0057	0.1458*	0.0573*	0.2689*	1.0000	
TV	-0.1018*	-0.7412*	0.6003*	0.7539*	0.5726*	-0.0602*	0.6740*	-0.1933*	0.0272	0.0210	-0.1191*	-0.1753*	-0.1746*	1.0000

Note: *Indicates significance level at 5%.

Table 5. 5 VIF Tests for the Relationship between Corporate Government Quality and Stock Liquidity

Variance Inflation Factors (VIF)					
Variable	QBAS	PIR	TR	TS	NT
SHP	5.24	5.24	5.15	5.24	5.24
TV	3.50	3.50	3.47	3.50	3.50
SIZE	2.89	2.89	2.90	2.89	2.89
RV	1.33	1.33	1.33	1.33	1.33
CGQIAIM	1.22	1.22	1.23	1.22	1.22
AT	1.21	1.21	1.21	1.21	1.21
LV	1.13	1.13	1.14	1.13	1.13
AGE	1.07	1.07	1.07	1.07	1.07
R&D	1.05	1.05	1.05	1.05	1.05
Mean VIF	***2.07***	***2.07***	***2.06***	***2.07***	***2.07***

5.5 Findings on the Relationship between Corporate Governance Quality and Liquidity

Subsequent to the presentation of the statistical information of the sample provided in previous sections, the current section will reveal the empirical findings on the relationship between corporate governance quality and stock liquidity. As thoroughly discussed in the methodology chapter (Section 4.4.1), the estimation method employed in this study is two-step system GMM with the aim of controlling for the endogeneity problems of unobservable heterogeneity, simultaneity and dynamic endogeneity.

To start with, it is necessary to determine the number of lags to be included in the model with different measures of stock liquidity. In particular, to capture the entire dynamic relationship of the impacts of past stock liquidity on current stock liquidity, this study follows the work of Wintoki et al. (2012) and Akbar et al. (2017), and employs three lagged dependent variables as explanatory variables. More details can be found in Section 4.4.1. Nevertheless, for different measures of stock liquidity as dependent variables, different numbers of lags may be applied. Therefore, a preliminary test (Section 4.4.1, Equation 4.3) is performed for this matter by regressing each measure of stock liquidity on their three lags, together with other controlling variables. The results are presented in Table 5.6.

According to the results of the preliminary test, the model with stock liquidity measured by the quoted bid-ask spread (QBAS) has three significant lags at a 1% level or below. This indicates that three lags should be included in the model to capture the momentum effects of past stock liquidity. In contrast, all three lags in the model with stock liquidity measured by the price impact ratio (PIR) are statistically insignificant. Therefore, it is not necessary to include lagged stock liquidity. In models of stock liquidity measured by turnover ratio (TR), trade size (TS) and number of trades (NT), only the significant first lagged variable is included.

Based on this preliminary test, the number of lags will be applied accordingly in the main models (Section 4.4.1, Equation 4.4) which include the main explanatory variable, i.e. the CGQIAIM. The analysis findings of ***hypothesis 1*** (Section 5.2) will be revealed in the subsequent section.

Table 5. 6 Number of Lags for Stock Liquidity Variables

The table below indicates the pooled OLS regression for Equation 4.3. To quickly recap, the equation is:

$$LIQUI_{it} = \alpha_1 + \sum_{g=1}^{g=3} \kappa_g LIQUI_{it-g} + \kappa C_{it} + \eta_i + \varepsilon_{it}$$

Where $LIQUI_{it}$ represents current stock liquidity variables, $LIQUI_{it-1}$, $LIQUI_{it-2}$ and $LIQUI_{it-3}$ represent the three lags of past stock liquidity variables, $Control_{it}$ represents the control variables (i.e. share price (SHR), return volatility (RV), firm size (SIZE), leverage (LV), firm age (AGE), research and development expenses (R&D), asset tangibility (AT) and trading volume (TV)).Year dummies and industry dummies are included in all regressions. Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean variables have significance at 1%, 5% and 10% levels respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	QBAS	PIR	TR	TS	NT
Liquidity t-1	4.396***	0.000	24.88***	0.000***	0.001*
	(11.80)	(0.29)	(4.72)	(3.63)	(1.95)
Liquidity t-2	-0.617**	-0.000	-3.279	-0.000	-0.000
	(-2.33)	(-0.30)	(-0.47)	(-0.65)	(-0.41)
Liquidity t-3	0.531***	0.000	0.695	0.000	0.001***
	(3.16)	(1.64)	(0.56)	(0.67)	(4.15)
SHP	-0.092***	-1.158***	0.028***	0.864***	0.028
	(-11.20)	(-31.00)	(2.89)	(34.32)	(1.54)
RV	-0.006	0.001***	-0.012**	0.000	-0.024**
	(-1.41)	(17.63)	(-2.22)	(0.02)	(-2.50)
SIZE	-0.238***	-0.201***	-0.056***	0.657***	0.353***
	(-20.09)	(-4.34)	(-4.69)	(20.91)	(14.60)
AGE	-0.041*	0.032	-0.047*	-0.134**	0.022
	(-1.67)	(0.29)	(-1.65)	(-2.57)	(0.44)
R&D	0.002	0.040***	-0.009***	-0.010**	-0.014***
	(1.22)	(4.75)	(-4.21)	(-2.37)	(-3.56)
AT	0.005*	0.046***	-0.015***	-0.006	-0.005
	(1.65)	(3.38)	(-3.75)	(-0.92)	(-0.87)
LV	-0.014**	-0.022	0.007	0.003	-0.005
	(-1.96)	(-0.67)	(0.72)	(0.16)	(-0.35)
TV	-0.000***	-0.000**	0.000***	0.001***	0.000***
	(-9.29)	(-2.32)	(12.59)	(6.43)	(15.78)
Constant	-2.151***	-4.970***	-5.886***	6.245***	1.184***
	(-16.03)	(-11.66)	(-46.77)	(17.69)	(4.28)
Observations	2,002	1,997	1,935	1,997	1,997
R-squared	0.742	0.739	0.401	0.778	0.523
Year/Industry effect	*YES/YES*	*YES/YES*	*YES/YES*	*YES/YES*	*YES/YES*

5.5.1 Effects of Corporate Governance Quality on Stock Liquidity

This section aims to provide the empirical findings for the first research question of this thesis, i.e. "does corporate governance quality influence stock liquidity on the AIM?" To quickly recap, as generally shown in Equation 4.4 (Section 4.4.1), the equation below is the main estimation of the system GMM tested in this study.

$$LIQUI_{it} = \alpha + \kappa_g \sum LIQUI_{it-g} + \beta CGQIAIM_{it} + \gamma C_{it} + \theta X_{it} + \mu i + \varepsilon_{it} \quad (5.1)$$

Where $LIQUI_{it}$ represents the five measures of stock liquidity (quoted bid-ask spread (QBAS), price impact ratio (PIR), turnover ratio (TR), trade size (TS) and number of trades (NT)), respectively). Note that the numbers of lags included are based on the results obtained in the preliminary results (Table 5.6) for each stock liquidity measure. Specifically, three lags are used for the QBAS, one lag for the TR, TS and NT, and no lags are included for the PIR**.** $CGQIAIM_{it}$ represents the corporate governance quality index. $Control_{it}$ represents the control variables, i.e. share price (SHR), return volatility (RV), firm size (SIZE), leverage (LV), firm age (AGE), research and development expenses (R&D), asset tangibility (AT) and trading volume (TV). X_{it} represents the exogenous variables (i.e. firm age and year dummies). *Mi* represents the unobserved fixed effects and ε_{it} represents the error terms.

Table 5.7 presents results for five models stated in Equation 5.1, with five measures of stock liquidity as dependent variables mentioned above. Also, robust standard errors being employed to control for heteroscedasticity and serial correlation.

With regards to the relationship between corporate governance quality (CGQIAIM) and informational friction variables, i.e. QBAS and PIR (Table 5.7, Columns 1 and 2), the results indicate that CGQIAIM has a negative and significant relationship with QBAS and PIR at 1% significance level ($\alpha_{CGQIAIM}$ = -0.452 and -2.499, respectively). That is to say the higher the quality of corporate governance, the lower the bid–ask spread and price impact ratio, which means increased stock liquidity. For the real friction variables (Columns 3, 4 and 5), CGQIAIM is found to be significantly positively related to TR, TS and NT ($\alpha_{CGQIAIM}$ = 0.491, 0.513 and 1.170; $p < 0.1$, 0.05 and 0.01, respectively). These findings imply that corporate governance quality positively influences the trading activity in the AIM, i.e. increased stock liquidity.

Overall, based on different measures of stock liquidity, corporate governance quality is positively associated with stock liquidity. This relationship has been supported by previous

studies on the topic (Chung et al., 2010, Karmani and Ajina, 2012, Lei et al., 2013, Prommin et al., 2014, Jiang et al., 2014, Ali et al., 2017). The finding is in line with the arguments that effective corporate governance enhances both operational and financial transparency, which leads to reduced asymmetric information between insiders and outsiders and therefore improved stock liquidity (Ali et al., 2017, Chung et al., 2010). As a result, ***hypothesis 1***, which states that corporate governance quality is positively related to stock liquidity, is accepted for FTSE AIM All-Share firms.

Regarding the controlling variables, the results show that firm share price (SHP) is found to exhibit a negative relationship with QBAS and PIR at 1% significance level and a positive relationship with TS at 1% significance level. These imply that SHP positively affects stock liquidity. This is consistent with prior studies, which show a negative relationship between share price and the bid–ask spread (Jegadeesh and Subrahmanyam, 1993, Amihud and Mendelson, 1986). Besides this, Stoll (2000) empirically also finds that higher share prices improve stock liquidity. Return volatility (RV) has a significantly positive relationship with PIR at 1% significance level and is negatively related with both TR and NT at 1% significance level. These findings indicate that higher RV dampens stock liquidity. This finding is consistent with the argument that higher volatility leads to higher uncertainty (Stoll, 2000) and therefore higher information asymmetry (Dierkens, 1991).

Additionally, the firms' market values of equity (SIZE) are found to be negatively associated with QBAS and PIR (α_{SIZE} = -0.251 and -0.625, $p < 0.01$, respectively) and positively related to TS and NT (α_{SIZE} = 0.164 and 0.454, $p < 0.01$, respectively). Therefore, it can be concluded that SIZE positively affects stock liquidity, which may be because large firms tend to disclose more public information, which may decrease the ability of risk bearing through market makers. This in turn can lead to reduced asymmetric information (Diamond and Verrecchia, 1991). The same finding was obtained by Stoll (2000). Moreover, older firms tend to exhibit lower stock liquidity, as the variable firm age (AGE) shows a significantly positive relationship with PIR (α_{AGE} = 0.507, $p < 0.01$) and a negative relationship with TR and TS (α_{AGE} = -0.369 and -0.148, $p < 0.01$, respectively). This relationship is in line with prior studies (e.g., Chung et al., 2010, Ali et al., 2017).[43]

[43] These studies find mixed results regarding the firm age. For instance, Chung et al. (2010) find a positive relationship between firm age and both quoted spread and effective spread in Nasdaq, i.e. firm age has a negative relationship with stock liquidity. In contrast, they found a positive relationship between firm age and stock liquidity on the NYSE/AMEX.

Also, research and development (R&D) reveals a positive association with QBAS and PIR, at 5% and 1% significance levels, respectively, and a negative and significant relationship with NT at 1% significance level. These findings suggest that R&D is negatively associated with stock liquidity. Previous studies, such as Aboody and Lev (2000) and Chung et al. (2010), have also obtained similar findings. It is argued by these studies that firms spending money on research and development have more problems of asymmetric information due to the difficulty of predicting the payoffs from the R&D. The negative relationship may also due to the fact that high- R&D expenditure firms are of lower relative size and, hence, less liquid. Furthermore, asset tangibility (AT) and financial leverage (LV) have no significant association with all stock liquidity variables.[44] Trading volume (TV) is negatively associated with QBAS ($p < 0.01$), but positively related to TR and NT ($p < 0.01$). This suggests that higher trading volume tends to be associated with higher stock liquidity, as suggested by (Stoll, 2000). In particular, it is argued that when a stock is traded actively, this implies that the stock is highly liquid (Chordia et al., 2001).

It is worth bringing readers' attention to the bottom section of Table 5.7, where results of all the specification tests discussed in Section 4.4.2 are presented. These include the first serial correlation (AR(1)), second serial correlation (AR(2)), Hansen test and differences in Hansen test. According to the results obtained, the null hypothesis that there is no serial correlation is accepted. This is because AR(1) is statistically significant at 1% significance level whilst AR(2) shows insignificant results for all models. In addition, the Hansen tests and differences in Hansen tests for all models are not significant. Therefore, it can be concluded that the employed instrumental variables are valid and are exogenous.

[44] Regarding the relationship between asset tangibility and stock liquidity, prior studies in the literature find mixed results. For example, Chung et al. (2010) report a positive association between asset tangibility and quoted spread, but a negative association with market quality index. Al-Jaifi et al. (2017) find an insignificant relationship between asset tangibility and turnover and trading volume. In the same line, the association between financial leverage and stock liquidity also has mixed results. For instance, Chung et al. (2010) find a positive relationship between leverage and quoted spread, but a negative relationship with price impact ratio. Foo and Zain (2010) find a positive relationship between leverage and trading volume, but a negative relationship with proportion of zero returns.

Table 5. 7 Effects of Corporate Governance Quality on Stock Liquidity

The table below reports the results of the system GMM using quoted bid–ask spread (QBAS) and price impact ratio (PIR) as proxies for informational friction and turnover ratio (TR), trade size (TS) and number of trades (NT) as proxies for real friction. The independent variable is the corporate governance quality (CGQIAIM). The control variables are share price (SHP), return volatility (RV), firm size (SIZE), firm age (AGE), research and development ratio (R&D), asset tangibility ratio (AT), financial leverage (LV) and trading volume (TV). Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively. P-values of AR (1) are test for first order serial correlation and p-values of AR (2) are for second order serial correlation, under the null hypothesis of no serial correlation. P-values of the Hansen test of over-identification are under the null hypothesis that all instrumental variables are valid. P-values of the difference in Hansen test of exogeneity are under the null hypothesis that instrumental variables employed in levels are exogenous.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	QBAS	PIR	TR	TS	NT
CGQIAIM	-0.452***	-2.499***	0.491*	0.513**	1.170***
	(-2.94)	(-4.91)	(1.82)	(1.99)	(3.47)
SHP	-0.142***	-0.934***	0.048	0.875***	0.102
	(-4.56)	(-8.16)	(1.30)	(26.04)	(1.53)
RV	0.002	0.989***	-0.064***	0.035	-0.131***
	(0.16)	(18.22)	(-3.21)	(1.47)	(-3.52)
SIZE	-0.251***	-0.625***	0.026	0.164***	0.454***
	(-7.43)	(-4.89)	(0.59)	(4.25)	(6.54)
AGE	0.018	0.507***	-0.369***	-0.148***	-0.174
	(0.40)	(3.76)	(-3.60)	(-2.68)	(-1.63)
R&D	0.015**	0.074***	-0.012	0.011	-0.063***
	(2.19)	(2.92)	(-1.45)	(1.04)	(-3.63)
AT	-0.003	0.004	0.000	-0.015	-0.005
	(-0.70)	(0.27)	(0.03)	(-1.34)	(-0.41)
LV	-0.012	-0.020	0.028	0.005	0.013
	(-0.60)	(-0.36)	(1.27)	(0.38)	(0.31)
TV	-0.000***	-0.000	0.000***	0.000	0.000***
	(-4.05)	(-0.56)	(5.41)	(1.04)	(8.05)
LIQUI-1	3.887***	-	16.81**	-0.000	0.001***
	(6.38)		(2.06)	(-0.11)	(2.79)
LIQUI-2	-0.924**	-	-	-	-
	(-2.53)				
LIQUI-3	0.532	-	-	-	-
	(1.34)				
Constant	-0.290	3.650**	-7.025***	3.667***	-3.380***
	(-0.57)	(2.07)	(-7.18)	(4.33)	(-3.15)
Observations	2,002	1,997	1,935	1,997	1,997
AR(1) test	0.000	0.000	0.000	0.000	0.000
AR(2) test	0.351	0.176	0.450	0.154	0.177
Hansen test of over-identification	0.132	0.123	0.131	0.126	0.104
Diff-in-Hansen tests of exogeneity	0.270	0.545	0.124	0.866	0.171

Overall, the system GMM estimator has indicated that firms listed on the AIM with higher quality of corporate governance tend to exhibit higher stock liquidity. This finding is consistent across all measures of stock liquidity. In the following section, this study will provide a number of robustness checks, i.e. the use of alternative measures of stock liquidity, and corporate governance categories to confirm the findings obtained in this section.

5.6 Robustness Checks

After conducting the main analysis using the system GMM, two additional tests will be carried out as robustness checks to confirm the findings obtained in Section 5.5.1. The first test re-examines the main investigated effects of corporate governance quality on two additional measures of stock liquidity. Those two measures are quoted depth and market quality index. In the second test, the main model is tested using each category of the corporate governance quality index. These are board composition, board committees, board transparency and board remuneration policy.

5.6.1 Quoted Depth and Market Quality Index

This section re-examines the relationship between corporate governance quality and stock liquidity, with the latter measured by quoted depth (QDP) and market quality index (MQI).

- **Quoted depth (QDP):** This measure has been employed extensively by prior studies as a proxy for stock liquidity (Brockman et al., 2009, Ginglinger and Hamon, 2012, Heflin and Shaw, 2000, Jacoby and Zheng, 2010, Næs, 2004, Rhee and Wang, 2009, Rubin, 2007, Sarin et al., 2000, Zhou, 2011, Foo and Zain, 2010). Following Rubin (2007), QDP is calculated as the sum of the number of shares at both the bid and ask prices multiplied by share price as follows:

  QDP = number of shares at both the bid and ask prices * share price

- **Market quality index (MQI):** This measure is another proxy for stock liquidity that has also been employed by previous studies (Chung et al., 2010, Jiang et al., 2011, Boellen and Whaley, 1998). Following Boellen and Whaley (1998), MQI is calculated by dividing the average of depth on bid–ask spread as follows:

$$\text{MQI} = \frac{Quoted\ depth/2}{\text{quoted bid}-\text{ask spread}}$$

Table 5.8 shows the results for the relationship between CGQIAIM and QDP and between CGQIAIM and MQI. In general, the findings are consistent with those obtained in the main analysis (Section 5.5.1, Table 5.7) such that higher corporate governance quality can improve stock liquidity. In detail, CGQIAIM has a significant positive relationship with both QDP and MQI ($\alpha_{CGQIAIM}$ = 1.652 and 2.510, $p < 0.01$, respectively). This positive relationship is in line with previous studies (e.g., Chung et al., 2010, Lei et al., 2013). It is argued that as effective corporate governance enhances both operational and financial transparency, it reduces asymmetric information between insiders and outsiders and therefore improves stock liquidity (Chung et al., 2010).

Given the above, after examining the relationship between corporate governance quality and stock liquidity using two additional proxies of stock liquidity – QDP and MQI – the results remain unchanged. This adds to the robustness and validity of the main findings.

Table 5. 8 Effects of Corporate Governance Quality on MQI and QDP

The table below reports the results of the system GMM for the relationship between corporate governance quality (CGQIAIM) and both market quality index (MQI) and quoted depth (QDP). The definitions of variables, as well as the four system GMM tests – AR (1), AR (2), Hansen test of over-identification and difference in Hansen test of exogeneity – are as in Table 5.7. Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

VARIABLES	(1) QDP	(2) MQI
CGQIAIM	1.652***	2.510***
	(4.21)	(5.50)
SHP	0.196***	0.368***
	(2.76)	(3.58)
RV	-0.082**	-0.074
	(-2.50)	(-1.43)
SIZE	0.626***	0.916***
	(8.22)	(7.43)
AGE	-0.295***	-0.392***
	(-3.63)	(-3.74)
R&D	-0.043***	-0.057***
	(-3.27)	(-2.85)
AT	0.003	0.014
	(0.27)	(0.85)
LV	0.007	0.005
	(1.16)	(0.69)
TV	0.000***	0.000***
	(8.23)	(5.57)
LAG-1[45]	0.000***	0.000**
	(2.78)	(2.27)
LAG-2	-	-
LAG-3	-	-
Constant	0.456	-0.945
	(0.35)	(-0.61)
Observations	2,000	2,002
AR(1) test	0.000	0.000
AR(2) test	0.142	0.420
Hansen test of over-identification	0.119	0.142
Diff-in-Hansen tests of exogeneity	0.686	0.821

[45] After employing the suitable number of lags to capture the dynamic effect test for both market quality index and quoted depth, the results show that the first lag of them is significant, which means that including one lag in the model is enough to capture the past impact of stock liquidity.

5.6.2 Corporate Governance Categories

The main empirical evidence shows that corporate governance quality is positively associated with stock liquidity. However, the index of the corporate governance quality is designed based on four governance categories: board composition (BCS), board committees (BCO), board transparency (BTS) and board remuneration policy (BRP).[46] In the second robustness test, the corporate governance quality is replaced by these four governance categories. In other words, the analysis examines the effect of each corporate governance category on stock liquidity. The measure of each category is explained in Tables 4.2. This test can further assist in understanding whether the results obtained in the main analysis are driven by each of the four categories.

The results on the effects of each corporate governance category on stock liquidity is shown in Tables 5.9, 5.10, 5.11 and 5.12. According to the results, all four governance categories show a positive relationship with stock liquidity. In more detail, Table 5.9 shows that BCS is negatively related to QBAS and PIR at 5% and 10% significance levels (α_{BCS}= -0.080 and -0.282, $p < 0.05$ and 0.1, respectively) and positively related to TS at 5% significance level (α_{BCS}= 0.095, $p < 0.05$). The positive relationship between BCS and stock liquidity is in line with the argument that effective boards of directors can effectively monitor management, make more accurate earnings forecasts (Ajinkya et al., 2005, Karamanou and Vafeas, 2005) and lower asymmetric information (Ali et al., 2017). For instance, independent directors have the ability to monitor and control top managers since they have contacts, knowledge and experience, as well as independence from the CEO (Kesner and Johnson, 1990). Their monitoring may enhance the compliance of firms with disclosure requirements, and therefore improve the quality and comprehensiveness of disclosures (Forker, 1992). Empirically, Ali et al. (2017) find that board quality, particularly board diligence, independent chairmen and independent directors, has a positive and significant relationship with stock liquidity in Australia.

Similarly, Table 5.10 shows that BCO has a negative relationship with QBAS and PIR (α_{BCO} = -0.026 and -0.281; $p < 0.1$ and 0.01, respectively) and a positive relationship with TR, TS and NT (α_{BCO} = 0.045, 0.074 and 0.167, $p < 0.05$, 0.1 and 0.01, respectively). This obtained relationship between BCO and stock liquidity is consistent with the argument that both audit

[46] BCS has a mean value of 4.1, BCO has a mean value of 6.7, BTS has a mean value of 13.3 and BRP has a mean value of 3.6.

and compensation committees have primary roles in monitoring managers and releasing information to shareholders (Klein, 1998). In detail, the main function of the audit committee is to meet systematically with both internal and external auditors of the firm in order to review the internal accounting controls, audit process and financial statements of the firm. This internal control helps to reduce the agency problem between the firm's manager and shareholders by smoothing and facilitating the release of accounting information to shareholders. Therefore, asymmetric information between outsiders and insiders is reduced (Klein, 1998). Empirically, Foo and Zain (2010) find that both the percentage of independent non-executive directors on the audit committee and the number of audit committee meetings have a positive relationship with stock liquidity. Also, Ali et al. (2017) find that audit, remuneration and nomination committees have a positive and significant relationship with stock liquidity.

Table 5.11 indicates that BTS is negatively and significantly associated with QBAS and PIR at 10% and 1% significance levels respectively and positively and significantly associated with TS and NT at 5% and 10% significance levels respectively. This positive relationship is in line with the argument that effective corporate governance reduces agency costs by decreasing information asymmetry; thus, the stock liquidity of firms can be improved by high transparency (Al-Jaifi et al., 2017). Besides this, a high level of transparency in firms is associated with a reduction in asymmetric information between insider and outsider shareholders, which in turn improves stock liquidity (Chung et al., 2010).

Finally, Table 5.12 finds that BRP is negatively and significantly associated with QBAS and PIR at 5% significance level and positively and significantly associated with TS and NT at 5% and 10% significance levels respectively. The positive relationship between BRP and stock liquidity is consistent with Klein (1998), who indicates that a compensation committee reviews and determines the amount and nature of the compensation for top managers and directors of the firm. It assists in mitigating the agency problem between the firm's managers and shareholders by implementing and constructing fair and desired bonus and incentive schemes for top managers. These incentive schemes can prevent managerial opportunism and lead the managers to work for the interests of shareholders. Particularly, the committee may aim to align the interests of top managers and shareholders. As a result, operational and financial transparency can be enhanced because managers may have little motivation and incentive to work in their own interest (Chung et al., 2010).

Overall, these results suggest that the association between CGQIAIM and stock liquidity is indeed fully driven by all corporate governance categories: BCS, BCO, BTS and BRP. This implies that firms should focus on all aspects of corporate governance to improve their stock liquidity.

Table 5. 9 Effects of Board Composition on Stock Liquidity

The table below reports the results of the system GMM using quoted bid–ask spread (QBAS) and price impact ratio (PIR) as proxies for informational friction and turnover ratio (TR), trade size (TS) and number of trades (NT) as proxies for real friction. The independent variable is the board composition (BCS). The definitions of control variables, as well as the four system GMM tests – AR (1), AR (2), Hansen test of over-identification and difference in Hansen test of exogeneity – are as in Table 5.7. Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	QBAS	PIR	TR	TS	NT
BCS	-0.080**	-0.282*	0.003	0.095**	0.005
	(-1.97)	(-1.76)	(0.08)	(2.27)	(0.07)
SHP	-0.137***	-0.887***	0.052	0.866***	0.124
	(-4.31)	(-9.21)	(1.37)	(14.40)	(1.62)
RV	0.007	1.073***	-0.066***	0.008	-0.156***
	(0.39)	(19.60)	(-3.27)	(0.36)	(-4.02)
SIZE	-0.267***	-0.710***	0.037	0.188***	0.515***
	(-7.42)	(-5.27)	(0.88)	(4.30)	(6.45)
AGE	-0.004	0.415***	-0.297***	-0.019	-0.097
	(-0.11)	(2.97)	(-2.90)	(-0.21)	(-0.99)
R&D	0.018***	0.067**	-0.009	-0.001	-0.056***
	(2.60)	(2.43)	(-1.26)	(-1.21)	(-3.08)
AT	0.016	0.003	0.005	0.005	-0.005
	(1.41)	(0.17)	(0.34)	(0.82)	(-0.40)
LV	-0.021	0.035	0.020	-0.000	-0.021
	(-0.89)	(0.56)	(0.94)	(-0.17)	(-0.51)
TV	-0.000***	-0.000	0.000***	-0.049	0.000***
	(-3.82)	(-1.54)	(5.16)	(-0.92)	(6.79)
LIQUI-1	4.279***	-	18.01**	0.000***	0.001***
	(6.45)		(2.12)	(2.64)	(2.80)
LIQUI-2	-1.023*	-	-	-	-
	(-1.95)				
LIQUI-3	0.638	-	-	-	-
	(1.63)				
Constant	-1.361***	-3.016***	-5.569***	4.761***	0.137
	(-5.15)	(-3.77)	(-15.10)	(9.75)	(0.29)
Observations	2,002	1,997	1,935	1,997	1,997
AR(1) test	0.000	0.000	0.000	0.000	0.000
AR(2) test	0.291	0.112	0.438	0.180	0.102
Hansen test of over-identification	0.106	0.116	0.167	0.165	0.137
Diff-in-Hansen tests of exogeneity	0.519	0.315	0.280	0.851	0.156

Table 5. 10 Effects of Board Committees on Stock Liquidity

The table below reports the results of the system GMM using quoted bid–ask spread (QBAS) and price impact ratio (PIR) as proxies for informational friction and turnover ratio (TR), trade size (TS) and number of trades (NT) as proxies for real friction. The independent variable is the board committees (BCO). The definitions of control variables, as well as the four system GMM tests – AR (1), AR (2), Hansen test of over-identification and difference in Hansen test of exogeneity – are as in Table 5.7. Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	QBAS	PIR	TR	TS	NT
BCO	-0.026*	-0.281***	0.045**	0.074*	0.167***
	(-1.86)	(-5.88)	(2.27)	(1.68)	(5.30)
SHP	-0.139***	-0.910***	0.031	0.787***	0.083
	(-4.92)	(-7.81)	(0.81)	(10.17)	(1.35)
RV	0.004	0.997***	-0.056**	0.019	-0.123***
	(0.24)	(19.87)	(-2.50)	(0.65)	(-3.27)
SIZE	-0.266***	-0.636***	0.037	0.111**	0.458***
	(-7.11)	(-4.51)	(0.93)	(2.13)	(6.57)
AGE	-0.008	0.402***	-0.063	-0.057	-0.119
	(-0.21)	(2.97)	(-0.86)	(-0.52)	(-1.18)
R&D	0.008	0.048**	-0.019***	0.015	-0.050***
	(1.22)	(2.11)	(-2.62)	(1.49)	(-3.09)
AT	-0.004	0.008	-0.004	-0.008	-0.007
	(-0.82)	(0.45)	(-0.27)	(-0.48)	(-0.48)
LV	-0.004	-0.010	0.032	-0.013	0.023
	(-0.18)	(-0.17)	(1.15)	(-0.35)	(0.65)
TV	-0.000***	-0.000	0.000***	0.000	0.000***
	(-4.54)	(-0.65)	(5.50)	(1.27)	(7.50)
LIQUI-1	3.769***	-	21.38**	0.000	0.001***
	(6.05)		(1.99)	(0.83)	(2.86)
LIQUI-2	-0.868**	-	-	-	-
	(-2.28)				
LIQUI-3	0.517	-	-	-	-
	(1.25)				
Constant	-1.568***	-2.684***	-6.423***	5.036***	-0.570
	(-7.36)	(-4.13)	(-19.89)	(16.33)	(-1.33)
Observations	2,002	1,997	1,935	1,997	1,997
AR(1) test	0.000	0.000	0.002	0.000	0.000
AR(2) test	0.353	0.194	0.146	0.169	0.175
Hansen test of over-identification	0.121	0.252	0.121	0.117	0.164
Diff-in-Hansen tests of exogeneity	0.158	0.578	0.166	0.609	0.222

Table 5. 11 Effects of Board Transparency on Stock Liquidity

The table below reports the results of the system GMM using quoted bid–ask spread (QBAS) and price impact ratio (PIR) as proxies for informational friction and turnover ratio (TR), trade size (TS) and number of trades (NT) as proxies for real friction. The independent variable is the board transparency (BTS). The definitions of control variables, as well as the four system GMM tests – AR (1), AR (2), Hansen test of over-identification and difference in Hansen test of exogeneity – are as in Table 5.7. Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	QBAS	PIR	TR	TS	NT
BTS	-0.029*	-0.179***	-0.016	0.060**	0.688*
	(-1.69)	(-3.39)	(-0.59)	(2.06)	(1.66)
SHP	-0.140***	-0.872***	0.068	0.748***	0.105
	(-4.29)	(-7.18)	(1.63)	(19.61)	(1.32)
RV	0.007	1.029***	-0.063***	-0.009	-0.143***
	(0.43)	(18.48)	(-2.72)	(-0.39)	(-3.50)
SIZE	-0.264***	-0.650***	0.021	0.120***	0.497***
	(-7.34)	(-4.97)	(0.50)	(3.96)	(6.61)
AGE	0.013	0.526***	-0.041	-0.107	-0.154
	(0.31)	(3.97)	(-0.51)	(-0.98)	(-1.42)
R&D	0.010	0.049**	-0.019***	0.002	-0.050***
	(1.40)	(1.98)	(-3.00)	(0.55)	(-2.80)
AT	-0.004	-0.000	0.012	-0.005	-0.002
	(-0.72)	(-0.00)	(0.85)	(-0.41)	(-0.17)
LV	-0.008	0.007	0.003	-0.001	-0.002
	(-0.39)	(0.14)	(0.11)	(-0.13)	(-0.05)
TV	-0.000***	-0.000	0.000***	0.000	0.000***
	(-3.55)	(-0.51)	(5.30)	(1.33)	(6.71)
LIQUI-1	4.008***	-	22.71**	0.000	0.001***
	(5.90)		(2.03)	(1.38)	(2.81)
LIQUI-2	-0.861**	-	-	-	-
	(-2.20)				
LIQUI-3	0.521	-	-	-	-
	(1.23)				
Constant	-1.413***	-2.240**	-6.000***	4.159***	-1.349
	(-4.95)	(-2.55)	(-14.86)	(11.86)	(-1.25)
Observations	2,002	1,997	1,935	1,997	1,997
AR(1) test	0.000	0.000	0.002	0.000	0.000
AR(2) test	0.467	0.153	0.213	0.140	0.179
Hansen test of over-identification	0.124	0.124	0.111	0.124	0.141
Diff-in-Hansen tests of exogeneity	0.182	0.425	0.155	0.593	0.156

Table 5. 12 Effects of Board remuneration Policy on Stock Liquidity

The table below reports the results of the system GMM using quoted bid–ask spread (QBAS) and price impact ratio (PIR) as proxies for informational friction and turnover ratio (TR), trade size (TS) and number of trades (NT) as proxies for real friction. The independent variable is the board remuneration policy (BRP). The definitions of control variables, as well as the four system GMM tests – AR (1), AR (2), Hansen test of over-identification and difference in Hansen test of exogeneity – are as in Table 5.7. Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	QBAS	PIR	TR	TS	NT
BRP	-0.040**	-0.174**	0.010	0.056**	0.097*
	(-2.01)	(-2.02)	(0.32)	(2.09)	(1.66)
SHP	-0.344***	-0.947***	0.072*	0.799***	0.093
	(-8.49)	(-7.94)	(1.92)	(22.90)	(1.24)
RV	-0.024	1.018***	-0.073***	0.009	-0.140***
	(-1.60)	(18.00)	(-3.67)	(0.35)	(-3.72)
SIZE	-0.086***	-0.729***	0.015	0.126**	0.493***
	(-2.74)	(-5.41)	(0.36)	(2.57)	(6.74)
AGE	-0.047	0.422***	-0.106	-0.135*	-0.138
	(-0.96)	(3.11)	(-1.28)	(-1.68)	(-1.41)
R&D	0.010**	0.064**	-0.020***	0.012	-0.062***
	(2.52)	(2.51)	(-2.72)	(1.30)	(-3.09)
AT	0.002	0.006	0.021	-0.005	-0.009
	(0.28)	(0.34)	(1.49)	(-0.40)	(-0.64)
LV	-0.003	0.056	0.041	-0.003	-0.016
	(-0.26)	(1.03)	(1.59)	(-0.36)	(-0.40)
TV	-0.246***	-0.000	0.000***	0.000	0.000***
	(-9.38)	(-0.04)	(6.03)	(0.90)	(6.73)
LIQUI-1	2.870***	-	21.96**	0.000	0.001***
	(5.16)		(2.19)	(0.97)	(2.67)
LIQUI-2	-0.455	-	-	-	-
	(-1.24)				
LIQUI-3	0.162	-	-	-	-
	(0.45)				
Constant	-0.049	-3.635***	-6.003***	5.269***	-0.004
	(-0.21)	(-6.07)	(-20.52)	(19.63)	(-0.01)
Observations	2,002	1,997	1,935	1,997	1,997
AR(1) test	0.000	0.000	0.001	0.000	0.000
AR(2) test	0.684	0.146	0.230	0.107	0.187
Hansen test of over-identification	0.362	0.141	0.132	0.116	0.148
Diff-in-Hansen tests of exogeneity	0.969	0.143	0.109	0.599	0.257

5.7 Additional Analysis: Mediating Effects of Information Disclosure on the Influences of Corporate Governance Quality on Stock Liquidity

Up to this point, this study has proven the positive effects of corporate governance quality on stock liquidity. A widely accepted argument for this is that control and monitoring through effective corporate governance mechanisms can reduce agency conflicts through higher levels of information disclosure (e.g., Huang and Zhang, 2012, Renders and Gaeremynck, 2012). Therefore, in this additional analysis, the current study aims to examine whether corporate governance quality improves stock liquidity through the enhancement of information disclosure. The method employed to test for this is the Baron and Kenny (1986) four-step mediation model (using system GMM). As discussed in Section 4.3.2, the number of regulatory announcements that are released by AIM firms is used as a proxy for information disclosure. These announcements can include acquisitions and alliances, AGMs and other meetings, board changes, capital structure, directors and shareholders, disposals, holdings in company, results of annual and interim reports, and trading updates. However, any news from outside sources such as press releases, analyst reports and any other general news from intermediate sources is excluded. Therefore, this information disclosure variable captures the information issued and directly distributed to the markets by the firms themselves (Ali et al., 2017, Beekes et al., 2015).

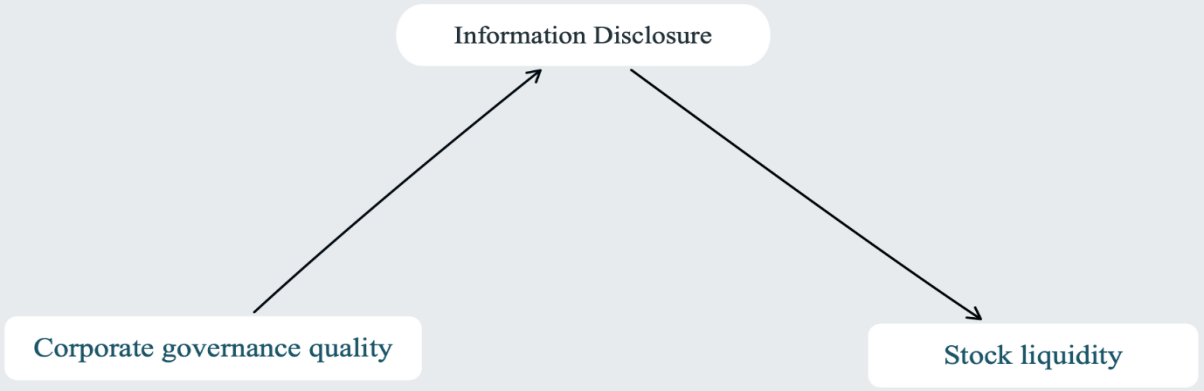
In order to examine whether corporate governance quality improves stock liquidity through the enhancement of information disclosure (ID),[47] the study employs the Baron and Kenny (1986) four-step mediation model. In detail, in the first step, stock liquidity is regressed on the corporate governance quality index (without information disclosure). In the second step, stock liquidity is regressed as a function of information disclosure (without the corporate governance quality index). In the third step, a model is tested to examine the impacts of the corporate governance quality index on information disclosure. If for all these three steps, the coefficients of the main explanatory variables are statistically significant, the fourth step will be performed. Otherwise, it can be concluded that no mediating effect of information disclosure (ID) is found.

In the last step, a model that contains stock liquidity as the dependent variable and both corporate governance quality index and information disclosure as independent variables are tested. In other words, stock liquidity is regressed on corporate governance quality and information disclosure. For this model, if the effect of corporate governance quality becomes

[47] The average number of regulatory announcements that are released by AIM firms is 24.81.

insignificant, it can be concluded that there is a full mediating effect of information disclosure. Specifically, corporate governance quality enhances stock liquidity fully through information disclosure (as shown in Figures 5.2). On the other hand, if the coefficient of corporate governance quality remains significant but with a decreasing level, it can be concluded that corporate governance quality enhances stock liquidity partially through information disclosure.

Figure 5.2 Complete Mediation Model



In terms of the findings, the first step, which examines the effect of corporate governance quality on stock liquidity has been obtained and discussed in previous sections (Section 5.7). The general finding for this step is that corporate governance quality is positively associated with stock liquidity. According to the results of the second step revealed in Panel A of Table 5.13, the corporate governance quality index (CGQIAIM) is significantly positively related to information disclosure (ID) at the 1% significance level ($\alpha_{CGQIAIM} = 0.659$). This indicates that higher corporate governance quality can increase the level of information disclosure. The results for the third step are shown in Panel B in Table 5.13. Across all measures of stock liquidity, information disclosure shows a positive relationship with stock liquidity ($\alpha_{ID} = -0.102$ for QBAS; -0.889 for PIR; 0.189 for TR; 0.742 for TS; and 0.764 for NT). All results are significant at the 1% significance level, except for QBAS and TR, for which the significance levels are 10% and 5% respectively. In other words, higher information disclosure tends to enhance stock liquidity.

Each of the first three steps have shown statistically significant results. This indicates that there exists a mediating effect of information disclosure. The last step is performed to indicate whether the mediating effect is full or partial. The results of this step are shown in Table 5.14. Intriguingly, when both corporate governance quality and information disclosure are included

as explanatory factors of stock liquidity, the former becomes statistically insignificant across all stock liquidity measures, whilst information disclosure remains significant. As a result, it is evident that the influence of corporate governance on stock liquidity is fully mediated through the information disclosure. To be specific, firms with higher corporate governance quality tend to enhance their information disclosure (As seen in Figure 5.3), which in turn improves stock liquidity. These relationships are consistent with explanations suggested by previous studies on the positive association between corporate governance and stock liquidity (e.g., Ali et al., 2017).

Figure 5.3 Trends of Corporate Government Quality and Information Disclosure from 2010 to 2016

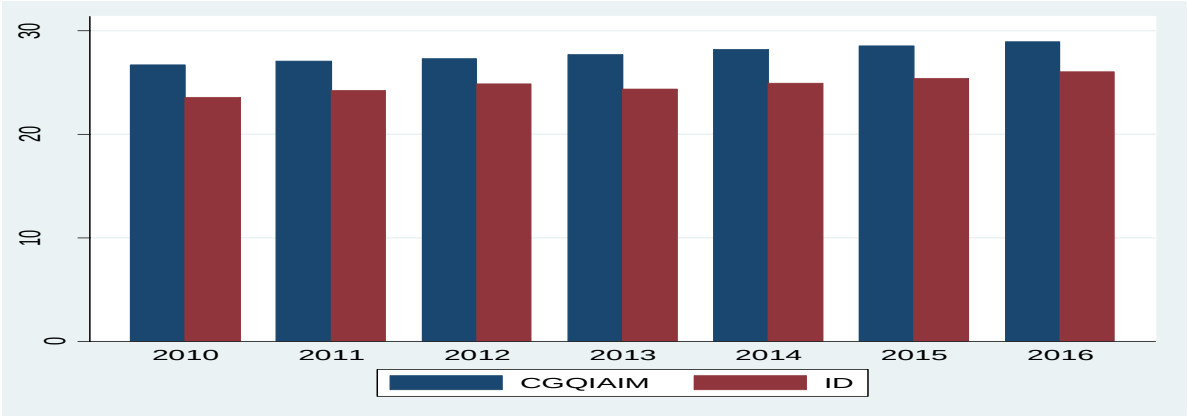


Table 5. 13 Corporate Governance Quality, Information Disclosure and Stock Liquidity

The table below reports the results of the system GMM for the relationship between corporate governance quality (CGQIAIM) and disclosure (panel A) and disclosure and stock liquidity variables (panel B). Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

VARIABLES	**PANEL (A)**	**PANEL (B)**				
	(1)	(1)	(2)	(3)	(4)	(5)
	Disclosure	QBAS	PIR	TR	TS	NT
ID		-0.102*	-0.889***	0.189**	0.742***	0.764***
		(-1.77)	(-4.66)	(1.99)	(3.33)	(6.28)
CGQIAIM	0.659***					
	(3.06)					
SHP	0.031	-0.093***	-0.959***	0.058	1.029***	0.123**
	(1.28)	(-4.04)	(-14.52)	(1.56)	(9.00)	(1.98)
RV	-0.066***	-0.021	1.034***	-0.055**	0.006	-0.078*
	(-3.79)	(-1.09)	(25.70)	(-2.41)	(0.14)	(-1.78)
SIZE	0.103***	-0.295***	-0.716***	0.019	0.833***	0.533***
	(2.58)	(-7.49)	(-5.04)	(0.38)	(3.34)	(6.36)
AGE	-0.265***	-0.001	0.516***	-0.111	-0.138	-0.104
	(-3.90)	(-0.03)	(3.13)	(-1.40)	(-1.05)	(-0.78)
R&D	0.007	0.017***	0.042**	-0.017***	-0.040***	-0.048***
	(1.11)	(3.00)	(2.34)	(-2.62)	(-6.23)	(-4.09)
AT	-0.002	0.017	-0.020	-0.000	-0.024	-0.004
	(-0.28)	(1.64)	(-0.68)	(-0.00)	(-0.60)	(-0.19)
LV	-0.005	-0.015	0.109**	0.028	-0.012	-0.097***
	(-0.23)	(-0.80)	(2.08)	(1.25)	(-0.39)	(-2.61)
TV	0.000**	-0.000*	-0.000	0.000***	0.000	0.000**
	(2.19)	(-1.80)	(-0.23)	(4.82)	(0.77)	(2.35)
LAG-1[48]	0.016***	3.889***	-	17.21**	0.000	0.001***
	(5.21)	(5.42)		(2.00)	(0.91)	(3.89)
LAG-2	-	-0.615	-	-	-	-
		(-1.19)				
LAG-3	-	0.651	-	-	-	-
		(1.51)				
Constant	1.024	-1.413***	-2.019***	-6.610***	3.324***	-1.594***
	(1.47)	(-5.36)	(-2.64)	(-17.47)	(5.85)	(-2.73)
Observations	2,002	2,002	1,997	1,935	1,997	1,997
AR(1) test	0.000	0.000	0.000	0.000	0.000	0.000
AR(2) test	0.242	0.749	0.165	0.265	0.127	0.553
Hansen test of over-identification	0.322	0.132	0.736	0.181	0.249	0.352
Diff-in-Hansen tests of exogeneity	0.392	0.647	0.680	0.112	0.238	0.211

[48] After employing the suitable number of lags to capture the dynamic effect test for the information disclosure (ID), the results show that only first lag of ID is significant, which means that including one lag in the model is enough to capture the past impact of information disclosure.

Table 5. 14 Effects of Corporate Governance Quality and Disclosure on Stock Liquidity

The table below reports the results of the system GMM of the relationship between corporate governance quality, information disclosure (ID) and stock liquidity. Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	QBAS	PIR	TR	TS	NT
ID	-0.106*	-0.974***	0.188*	0.791***	0.537***
	(-1.75)	(-5.36)	(1.75)	(5.07)	(4.32)
CGQIAIM	-0.279	-0.473	0.113	-0.290	0.487
	(-1.38)	(-0.92)	(0.36)	(-0.53)	(1.30)
SHP	-0.095***	-0.931***	0.058	1.000***	0.082
	(-4.02)	(-14.66)	(1.63)	(14.81)	(1.21)
RV	-0.021	1.018***	-0.054**	0.015	-0.106***
	(-1.11)	(24.80)	(-2.49)	(0.50)	(-2.79)
SIZE	-0.287***	-0.647***	0.013	0.795***	0.460***
	(-6.97)	(-4.91)	(0.31)	(6.51)	(5.85)
AGE	0.019	0.492***	-0.139**	-0.105	-0.026
	(0.34)	(2.84)	(-2.33)	(-0.89)	(-0.25)
R&D	0.021***	0.051***	-0.016***	-0.038**	-0.060***
	(3.37)	(2.76)	(-2.60)	(-2.51)	(-3.54)
AT	0.022*	-0.028	-0.001	-0.014	-0.009
	(1.91)	(-0.89)	(-0.12)	(-0.56)	(-0.73)
LV	-0.019	0.122**	0.029	-0.009	-0.004
	(-1.02)	(2.33)	(1.36)	(-0.70)	(-0.09)
TV	-0.000*	-0.000	0.000***	0.000	0.000***
	(-1.91)	(-0.64)	(4.88)	(1.20)	(5.21)
LIQUI-1	3.950***	-	17.76**	0.000*	0.001***
	(5.62)		(1.98)	(1.94)	(3.34)
LIQUI-2	-0.394	-	-	-	-
	(-0.76)				
LIQUI-3	0.396	-	-	-	-
	(0.93)				
Constant	-0.489	-0.147	-6.918***	4.117**	-3.040***
	(-0.74)	(-0.08)	(-6.91)	(2.22)	(-2.83)
Observations	2,002	1,997	1,935	1,997	1,997
AR(1) test	0.000	0.000	0.000	0.000	0.000
AR(2) test	0.895	0.190	0.284	0.118	0.180
Hansen test of over-identification	0.156	0.687	0.299	0.120	0.130
Diff-in-Hansen tests of exogeneity	0.813	0.682	0.352	0.531	0.582

5.8 Summary

In the first piece of empirical research of this thesis, the main objective is to examine the association of corporate governance quality and stock liquidity of AIM firms from 2010 to 2016. The topic itself has only been studied since 2010 and as the literature review demonstrates, none of the previous studies have conducted their investigations in the UK. As a result, this study contributes to the literature by studying such an important topic in finance

in one of the biggest and most influential financial markets in the world (the UK) using an emerging, growing and successful stock market within this country (the Alternatively Investment Market, AIM). Regarding methodology, the study employs a corporate governance quality index that covers four different aspects of firm governance: board composition, board committees, board transparency and board remuneration policy, together with various measures of stock liquidity (both informational and real frictions). Besides this, the main statistical analysis of the study is the system GMM, which can take into account different sources of endogeneity problems.

Based on the results of the main tests and robustness tests, the findings obtained indicate that corporate governance quality is positively related to the stock liquidity of AIM firms. This implies that firms with more effective corporate governance mechanisms tend to exhibit higher stock liquidity. Furthermore, the study intriguingly finds that such positive influence of corporate governance can be attributed to all four governance categories. As a result, firms should target all aspects to achieve effective governance for higher stock liquidity.

Furthermore, by employing the Baron and Kenny (1986) mediation test, this study confirms that the increase in stock liquidity by higher corporate governance quality is indeed operated fully through the increased information disclosure of firms. This finding is consistent with the explanation proposed by previous studies (Ali et al., 2017, Chung et al., 2010).

Chapter 6 Ownership Structure and Stock Liquidity

6.1 Introduction

The impact of ownership structure on stock liquidity has received extensive attention in the last two decades. Agency conflicts, i.e. the separation of ownership from control, are considered the main reason behind the relationship between ownership structure and stock liquidity (Berle and Means, 1932, Maug, 1998). Managers have been found to employ self-serving behaviours, e.g. excessive consumption of perquisite to expropriate the wealth of minority shareholders. Control–ownership separation may adversely lead to reduced stock liquidity due to the increase in asymmetric information between informed (managerial) traders and uninformed (minority) shareholders (Chu et al., 2015). In this regard, the UK regulators emphasise the important role of institutional shareholders in monitoring their investee companies (FRC, 2010b). The literature also argues that large shareholders may play an effective role in monitoring firm managers and therefore reducing agency problems. For instance, blockholders can decrease managerial consumption of perquisites (John and Senbet, 1998), as well as reduce the self-interested behaviours of the managers, and therefore enhance firm value (Shleifer and Vishny, 1997).

However, the monitoring role played by some owners may lead them to access private information about the firm and therefore become informed traders. Based on this, the literature suggests two standpoints: adverse selection and trading perspective. The first argues that informed ownership holds a high proportion of a firm's outstanding shares and has greater information in comparison to other shareholders. Thus, asymmetric information arises, which leads to reduced stock liquidity (Easley and O'Hara, 1987, Glosten and Milgrom, 1985, Grossman and Hart, 1986, Kyle, 1985). The second is trading perspective, which claims that shareholders, typically institutional ownership, repeatedly turn over their portfolios. Their aggressive trading may reduce transaction costs, which leads to a positive influence on stock liquidity (Merton, 1987, Demsetz, 1968, Schwartz and Shapiro, 1992).

Building on the above discussions, previous empirical studies examine the effect of ownership concentration on stock liquidity (e.g., Heflin and Shaw, 2000), the effect of institutional ownership on stock liquidity (e.g., Ajina et al., 2015) and the effect of insider and institutional ownership on stock liquidity whilst ignoring ownership concentration (e.g., Chiang and Venkatesh, 1988). However, only a few studies jointly investigate the associations between

insider ownership, institutional ownership, ownership concentration and stock liquidity (e.g., Rubin, 2007). Moreover, the vast majority of ownership structure and stock liquidity studies have been conducted in the US market (e.g., Brockman et al., 2009, Fehle, 2004, Heflin and Shaw, 2000, Jacoby and Zheng, 2010, Kini and Mian, 1995, Poon et al., 2013, Rubin, 2007). Very few studies have been conducted in the main market of the UK (e.g., Iskandrani et al., 2015), and in these, the AIM is ignored.

Nevertheless, the composition of ownership structure and investor protection for the AIM is found to be different from the main market of the UK, i.e. the AIM has low investor protection and high ownership concentration (Mortazian et al., 2018) whilst the main market of the UK is characterised by high investor protection and high ownership dispersion (Franks and Mayer, 2017, Mortazian et al., 2018). Therefore, contributing to the literature, the current study investigates this topic in the AIM, the most successful growth market in the world. This study employs a comprehensive set of different ownership structures, i.e. insider ownership, institutional ownership, concentrated ownership and minority shareholders and their effect on stock liquidity.

This chapter starts with the provision of the hypothesis development of the study. Subsequently, descriptive statistics will be provided and discussed. Following this, findings from the empirical analysis of the association between ownership structure and stock liquidity, as well as the robustness check, will be presented.

6.2 Hypothesis Development

To proceed to hypothesis development of this study, both theoretical and empirical studies on the linkages between ownership structure (insider ownership, institutional ownership, concentrated ownership and minority shareholders) and stock liquidity are taken into account. To avoid repetition, detailed information about those ownership structures was discussed in Sections 3.2.3 and 3.3.2 for the theoretical framework, and from Section 3.3.2.1 to Section 3.3.2.5 for the empirical literature.

In brief, prior studies of ownership structure have regarded insider owners as informed traders (Bettis et al., 2000, Jaffe, 1974, Lin and Howe, 1990, Lakonishok et al., 2001, Rubin, 2007). Seyhun (1986) states that due to the possession of more private information, insiders can anticipate the future movements of stock prices. Hence, they tend to sell/buy stocks prior to a

price decline/increase. When insiders trade, asymmetric information increases (Chiang and Venkatesh, 1988, Glosten and Milgrom, 1985, Næs, 2004, Zhou, 2011). As a result, market makers increase the bid–ask spread in order to reduce their asymmetric losses, which in turn dampens stock liquidity (Chiang and Venkatesh, 1988, Dennis and Weston, 2001, Rubin, 2007). Besides this, Holmström and Tirole (1993) indicate that when insiders decide to decrease their proportion of shares in a firm, stock liquidity should improve, since there will be a higher number of shares available for new active investors. A number of empirical studies have examined the impacts of insider ownership on stock liquidity (e.g., Chiang and Venkatesh, 1988, Sarin et al., 2000, Rubin, 2007, Zhou, 2011, Iskandrani et al., 2015, Gjerde et al., 2013). These studies find a negative relationship between insider ownership and stock liquidity. Consequently, the following hypothesis will be tested:

Hypothesis 1: Insider ownership is negatively related to stock liquidity.

In addition to insider ownership, it is argued that although institutional owners may be better at obtaining and processing information and better informed than small or individual investors (Bartov et al., 2000, Dennis and Weston, 2001), because they do not only concentrate on one investment like inside traders, institutional traders may have little incentive to monitor the management of the firm. Generally, institutional traders are considered liquidity traders (Chiang and Venkatesh, 1988). Besides this, institutional owners repeatedly turn over their portfolios. Their aggressive trading should reduce transaction costs, which leads to a positive influence on stock liquidity (Merton, 1987, Demsetz, 1968, Schwartz and Shapiro, 1992). Coffee (1991) also indicates that institutional shareholders in the US hardly take action in monitoring firms' management due to considering liquidity a higher priority than playing a monitoring role in the corporation. Over-regulation may be the factor limiting the activism of institutional shareholders. A number of empirical studies have examined the impacts of institutional ownership on stock liquidity (e.g., Kini and Mian, 1995, Jennings et al., 2002, Fehle, 2004, Rubin, 2007, Jiang et al., 2011, Ajina et al., 2015), and the relationship between the number of institutions and stock liquidity (e.g., Blume and Keim, 2012, Liu, 2013). These studies find a positive relationship between both institutional ownership and number of institutions and stock liquidity. Consequently, the following hypotheses will be tested:

Hypothesis 2: Institutional ownership is positively related to stock liquidity.

Hypothesis 3: Number of institutions is positively related to stock liquidity.

Another aspect of ownership structure is the ownership concentration of firms. Prior studies have argued that concentrated ownership is regarded as informed traders (Comerton-Forde and Rydge, 2006, Barclay and Holderness, 1991, Heflin and Shaw, 2000, Jacoby and Zheng, 2010), as shareholders may have access to private information about firms (Bhide, 1993, Brockman et al., 2009, Heflin and Shaw, 2000). Therefore, this type of ownership structure tends to negatively affect stock liquidity (Brockman et al., 2009, Jacoby and Zheng, 2010, Heflin and Shaw, 2000, Rubin, 2007). Bhide (1993) also states that although active shareholders, such as concentrated ownership, monitor firm management and reduce agency costs, they also access private information, which increases asymmetric information and therefore decreases stock liquidity. A number of empirical studies have examined the impacts of ownership concentration, i.e. blockholder and large shareholders, on stock liquidity (e.g., Heflin and Shaw, 2000, Næs, 2004, Attig et al., 2006, Staglianò et al., 2018, Brockman et al., 2009, Ginglinger and Hamon, 2012). These studies find a negative relationship between ownership concentration, i.e. blockholder and large shareholders, and stock liquidity. Consequently, the following hypotheses will be tested:

Hypothesis 4: Significant ownership is negatively related to stock liquidity.

Hypothesis 5: Substantial ownership is negatively related to stock liquidity.

Whilst the vast majority of existing studies have paid extensive attention to insider, institutional, concentrated ownership and their relationships with stock liquidity, minority shareholders are relatively ignored. When a firm is owned by a large number of small shareholders, it is deemed to have a dispersed ownership. Since each shareholder only possesses a small stake in the company, it is difficult and/or there is probably no sufficient incentive for them to monitor and control the firm's management (Ragazzi, 1981). Therefore, those minor shareholders may not get access to the firm's inside information, and are uninformed. Consequently, Bhide (1993) and Kothare (1997) argue that when a firm's ownership is strongly diluted, the stock of the firm is likely to be liquid due to relatively small bid–ask spread. In addition, Bolton and Thadden (1998) mention that in markets that are characterised by dispersed ownership, such as the UK and the US, the stock liquidity tends to be higher than markets with concentrated ownership, since the trading activities on those firms' shares are more vigorous. Similarly, Amihud et al. (1999) find that firms with a high level of liquidity traders (i.e. dispersed ownership) tend to have higher stock liquidity. Nevertheless, both studies raise the concern that despite such positive impacts of dispersed ownership on

stock liquidity, one of its main drawbacks is the likelihood of less effective corporate control and higher agency conflicts. Consequently, the following hypothesis will be tested:

Hypothesis 6: Minority shareholders are positively related to stock liquidity.

6.3 Descriptive Statistics

As discussed in Section 4.2, the sample employed in this study consists of firms listed in the FTSE AIM All-Share Index (excluding the financial sector) over a seven-year period from 2010 to 2016. The total sample being studied is 595 firms. The current section aims at providing the descriptive statistics of the components of ownership structure variables, i.e. insider ownership, institutional ownership, concentrated ownership and minority shareholders (Table 6.1). Subsequently, the averages of those ownerships across years and across industries are revealed in Tables 6.2 and 6.3, respectively.

Insider ownership (IO) has a mean value of 16.1%, standard deviation (SD) of 17.2%, minimum value of 0.1%, and maximum value of 59.3%. Institutional ownership (ITO) has a mean value of 56.9%, SD of 32.5%, minimum value of 0% and maximum value of 100%. Significant ownership (SGO) (with substantial ownership (SUBO) values in parentheses) has a mean value of 41.7% (37.4%), SD of 23.9% (15.2%), minimum value of 3% (10%), and maximum value of 88% (65%). Moreover, minority shareholders (MINO) have a mean value of 16.8%, SD of 7%, minimum value of 0%, and maximum value of 27.3%.

Table 6. 1 Descriptive Statistics

The table below presents the descriptive statistics for ownership structure and includes means, medians, standard deviations, minimum, percentiles and maximum during the period from 2010 to 2016 for AIM firms. The ownership structure variables are insider ownership (IO), institutional ownership (ITO), number of institutions (NITO), substantial ownership (SUBO), significant ownership (SGO) and minority shareholders (MINO).

Variable	Mean	Median	SD	Min	P25	P75	Max
IO (%)	16.13	9.244	17.26	0.100	2.430	24.90	59.33
ITO (%)	56.98	60.87	32.59	0.000	29.46	86.35	100.0
NITO	40.67	38.00	36.14	0.000	7.000	61.00	315.0
SUBO (%)	37.47	37.24	15.21	10.04	25.94	48.86	65.06
SGO (%)	41.76	40.73	23.97	3.040	22.10	60.37	88.20
MINO (%)	16.83	17.47	7.000	0.000	12.28	22.11	27.30

Table 6.2 and Table 6.3 provide the average of AIM firms' ownership structure variables across the investigated period from 2010 to 2016, and across industries, respectively. Intriguingly, although the lowest percentage of insider ownership (IO) is in the year 2016, with an average of 12.1%, the highest percentage of institutional ownership (ITO), substantial ownership (SUBO) and minority shareholders (MINO), with an average of 68.4%, 41.6% and 17.7% respectively, is also in 2016. These findings are in line with the arguments of Holmström and Tirole (1993), who indicate that when insiders decide to decrease their proportion of shares in the firm, there will be a higher number of shares available for new active investors. Besides this, the year 2011 has the highest percentage of insider ownership (IO) and number of institutions (NITO) with an average of 20.8% and 52.5 respectively. In contrast, 2010 has the lowest percentage of substantial ownership (SUBO) and minority shareholders (MINO) with an average of 34%, 15.9% respectively.

Table 6. 2 Means of the Ownership Structure Variables for Each Year (2010–2016)

Variable	2010	2011	2012	2013	2014	2015	2016
IO (%)	15.17	**20.83**	19.15	19.61	14.07	13.35	**12.11**
ITO (%)	68.21	60.94	53.47	**49.85**	49.94	50.68	**68.49**
NITO	51.89	**52.55**	39.80	37.04	**35.82**	35.93	36.08
SUBO (%)	**34.01**	35.02	36.49	37.76	37.14	39.04	**41.60**
SGO (%)	39.15	42.84	**44.96**	43.99	42.03	40.49	**38.51**
MINO (%)	**15.94**	16.59	17.05	16.60	16.46	17.19	**17.76**

According to Table 6.3, it is apparent that Basic Materials has the lowest percentage of insider ownership, institutional ownership and substantial ownership with averages of 9.7%, 43.8% and 33.2% respectively, whereas Utilities has the highest percentages of ownership concentration of both significant and substantial ownerships with averages of 49.1% and 44.8% respectively. Telecommunications has the highest number of institutions with averages of 56, whereas Consumer Services has the lowest percentage of minority shareholders (14%). The highest percentages of both insider ownership and institutional ownership are in Health Care and Technology, with averages of 67% and 22% respectively.

Table 6. 3 Means of the Ownership Structure Variables for Each Industry

Variable	Basic Materials	Utilities	Telecommunications	Consumer Goods	Consumer Services	Health Care	Oil & Gas	Industrials	Technology
IO (%)	**9.710**	11.92	16.16	16.05	19.87	12.85	10.13	21.78	**22.44**
ITO (%)	**43.80**	53.71	64.84	57.50	58.10	**67.80**	56.08	60.09	62.73
NITO	31.32	**24.36**	**56.85**	43.25	38.12	50.69	49.60	39.50	40.07
SUBO (%)	**33.28**	**44.85**	44.81	40.34	40.57	40.38	33.82	39.71	36.86
SGO (%)	42.42	**49.11**	42.62	44.72	46.46	**34.71**	39.18	44.41	38.59
MINO (%)	18.02	16.27	15.39	16.46	**14.67**	17.88	**18.70**	15.96	15.82

6.4 Correlation Matrix

As previously discussed in Section 4.4.2, regarding multicollinearity, the section provides two common tests for this issue, namely correlation and VIF. Firstly, the correlation matrix is presented in Table 6.4 to reveal the correlation variables included in the studies, i.e. ownership structure, stock liquidity and controlling variables. Subsequently, Table 6.5 reveals the VIF for each variable in the model.

According to the correlation results (Table 6.4), the highest correlation obtained is between share price (SHP) and firm size (SIZE) ($r \sim 0.56$, $p < 0.05$). This indicates that larger firms tend to exhibit higher share price. The second highest correlation obtained is between firm size (SIZE) and number of institutions (NITO) ($r \sim 0.46$, $p < 0.05$). This indicates that larger firms tend to have higher numbers of institutions. It is also worth mentioning that the correlation between analyst following (AF) and number of institutions (NITO) is 35%. This is in line with the argument of Lang and Lundholm (1993) and Kini and Mian (1995), who indicate that analysts tend to follow firms that have greater number of institutions. Besides this, the correlation between firm age (AGE) and minority shareholders (MINO) is 40%. This may imply that older firms tend to have higher numbers of small shareholders than younger ones.

Nevertheless, as discussed in Section 4.4.2, the existence of multicollinearity can be confirmed if the correlation coefficient is higher than 80% between two independent variables. Consequently, the correlation test cannot reject the null hypothesis that multicollinearity is present. The conclusion is confirmed by the VIF test presented in Table 6.5. As all VIF values are below 10, the indication is that there are no multicollinearity problems within the models.

Table 6. 4 Correlation Matrix for the Relationship between Ownership Structure and Stock Liquidity

	QBAS	PIR	TR	TV	NT	IO	ITO	NITO	SGO	SUBO	MINO	AF	SHP	RV	SIZE	AGE	LV
QBAS	1.0000																
PIR	-0.2641*	1.0000															
TR	-0.1095*	-0.4773*	1.0000														
TV	-0.1018*	-0.7412*	0.6003*	1.0000													
NT	-0.6076*	-0.2941*	0.5800*	0.5726*	1.0000												
IO	-0.0059	0.1310*	-0.0755*	-0.1134*	-0.0953*	1.0000											
ITO	-0.2534*	0.0616*	-0.0816*	-0.0013	0.0951*	0.0389*	1.0000										
NITO	-0.5472*	0.1020*	0.0888*	0.1188*	0.4614*	0.0753*	0.3644*	1.0000									
SGO	0.1877*	0.0928*	-0.1758*	-0.1358*	-0.2540*	0.1625*	-0.1114*	-0.1431*	1.0000								
SUBO	-0.1184*	0.0182	-0.0722*	-0.0122	0.0035	0.0551*	0.1583*	0.0633*	0.0202	1.0000							
MINO	-0.0610*	-0.1029*	0.0375*	0.1060*	0.1142*	0.1167*	0.1971*	0.2176*	-0.1078*	0.1196*	1.0000						
AF	-0.4709*	0.1471*	-0.0337*	0.0277	0.2578*	0.0667*	0.2098*	0.3541*	-0.0805*	0.0925*	0.0969*	1.0000					
SHP	-0.5503*	0.7347*	-0.2351*	0.6740*	0.0889*	0.0660*	0.1768*	0.2983*	-0.0819*	0.0451*	-0.0729*	0.2956*	1.0000				
RV	-0.4009*	0.7279*	-0.1151*	-0.1933*	0.1160*	0.0942*	0.0829*	0.2285*	0.0257	-0.0065	0.0042	0.2101*	0.4313*	1.0000			
SIZE	-0.7600*	0.3275*	-0.1128*	0.0272	0.4568*	-0.0082	0.2772*	0.4656*	-0.1452*	0.1118*	0.0198	0.4378*	0.5650*	0.4136*	1.0000		
AGE	-0.0022	-0.0665*	-0.0294	0.0210	0.0472*	0.1284*	0.1103*	0.1504*	0.0166	0.1581*	0.4073*	0.0518*	-0.0584*	-0.0784*	-0.0309	1.0000	
LV	0.0182	0.1371*	-0.1320*	-0.1746*	-0.1646*	0.0960*	0.0145	0.0037	0.0960*	0.0453*	0.0067	0.0114	0.1008*	0.0002	0.0057	0.1458*	1.0000

Note: *Indicates significance level at 5%.

Table 6. 5 VIF Tests for the Relationship between Ownership Structure and Stock Liquidity

Variance Inflation Factors (VIF)					
Variable	QBAS	PIR	TR	TV	NT
SIZE	2.00	1.99	1.98	1.99	1.99
SHP	1.67	1.68	1.67	1.68	1.68
NITO	1.51	1.51	1.51	1.51	1.51
RV	1.36	1.37	1.37	1.37	1.37
AF	1.30	1.30	1.29	1.30	1.30
MINO	1.27	1.27	1.27	1.27	1.27
AGE	1.24	1.24	1.24	1.24	1.24
ITO	1.23	1.23	1.23	1.23	1.23
SGO	1.10	1.10	1.11	1.10	1.10
IO	1.09	1.09	1.09	1.09	1.09
SUBO	1.08	1.08	1.07	1.08	1.08
LV	1.06	1.06	1.07	1.06	1.06
Mean VIF	***1.33***	***1.33***	***1.32***	***1.33***	***1.33***

6.5 Findings on the Relationship between Ownership Structure and Liquidity

Subsequent to the statistical information of the sample provided in previous sections, the current section will reveal the empirical findings on the relationship between ownership structure and stock liquidity. As thoroughly discussed in the methodology chapter (Section 4.4.1), the estimation method employed in this study is the two-step system GMM with the aim of controlling for the endogeneity problems of unobservable heterogeneity, simultaneity and dynamic endogeneity.

Since the empirical analysis of this chapter employs a lower number of controlling variables (share price, return volatility, firm size, firm age and leverage) compared to the first empirical analysis (share price, return volatility, firm size, firm age, leverage, asset tangibility ratio, research development ratio and trading volume), it is necessary to re-examine the determination of the number of lags to be included in the models with different measures of stock liquidity. To avoid repetition, the explanation of the preliminary test can be found in Sections 4.4.1 and 5.5.

However, it is apparent that the number of lags of the different measures of stock liquidity obtained in Table 6.6 is the same as shown in Section 5.5 (Table 5.6). In more detail, the model with stock liquidity measured by the quoted bid-ask spread (QBAS) has three significant lags at the 1% level or below. This indicates that three lags should be included in the model to capture the momentum effects of the past stock liquidity. In contrast, all three lags in the model with stock liquidity measured by the price impact ratio (PIR) are statistically insignificant. Therefore, it is not necessary to include lagged stock liquidity. In models of stock liquidity measured by turnover ratio (TR), trading volume (TV) and number of trades (NT), only the significant first lagged variable is included.

Based on this preliminary test, the number of lags will be applied accordingly in the main models (Section 4.4.1, Equation 4.5) which include the main explanatory variable, i.e. the ownership strcture variables (insider ownership, institutional ownership, ownership concentration and minority shareholders). The analysis findings of the ***seven hypotheses*** (Section 6.2) will be revealed in the subsequent section.

Table 6. 6 Number of Lags for Stock Liquidity Variables

The table below indicates the pooled OLS regression for Equation 4.3. To quickly recap, the equation is:

$$LIQUI_{it} = \alpha_1 + \sum_{g=1}^{g=3} \kappa_g LIQUI_{it-g} + \kappa C_{it} + \eta_i + \varepsilon_{it}$$

Where $LIQUI_{it}$ represents current stock liquidity variables, $LIQUI_{it-1}$, $LIQUI_{it-2}$ and $LIQUI_{it-3}$ represent the three lags of past stock liquidity variables, $Control_{it}$ represents the control variables (i.e. share price (SHR), return volatility (RV), firm size (SIZE), leverage (LV), firm age (AGE) and analyst following (AF)). Year dummies and industry dummies are included in all regressions. Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean variables have significance at 1%, 5% and 10% levels respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	QBAS	PIR	TR	TV	NT
Liquidity t-1	4.413***	0.000	32.17***	0.000***	0.001*
	(11.77)	(0.16)	(4.23)	(3.57)	(1.73)
Liquidity t-2	-0.708***	-0.000	-3.878	0.000	-0.000
	(-2.63)	(-0.53)	(-0.41)	(1.13)	(-0.42)
Liquidity t-3	0.489***	0.000	0.764	-0.000	0.001***
	(2.82)	(1.33)	(0.45)	(-0.96)	(3.30)
SHP	-0.060***	-1.221***	0.079***	0.703***	0.104***
	(-8.51)	(-37.97)	(8.91)	(35.81)	(5.89)
RV	-0.000	0.001***	-0.000***	-0.000***	-0.000***
	(-0.15)	(21.02)	(-5.48)	(-3.96)	(-3.47)
SIZE	-0.243***	-0.119**	0.000***	0.001***	0.384***
	(-20.24)	(-2.54)	(6.60)	(3.39)	(14.40)
LV	-0.010	0.015	-0.001	-0.004	-0.007
	(-1.49)	(0.48)	(-0.16)	(-0.15)	(-0.49)
AGE	-0.037	0.049	-0.052*	-0.261***	0.006
	(-1.50)	(0.45)	(-1.65)	(-4.11)	(0.12)
AF	-0.008***	-0.147***	-0.002	0.202***	0.057***
	(-6.10)	(-4.77)	(-1.34)	(9.26)	(3.84)
Constant	-2.385***	-5.871***	-5.200***	7.472***	1.765***
	(-16.80)	(-14.25)	(-32.07)	(36.18)	(5.80)
Observations	2,010	2,005	1,942	2,005	2,005
R-squared	0.734	0.738	0.271	0.692	0.449
Year/Industry effect	*YES/YES*	*YES/YES*	*YES/YES*	*YES/YES*	*YES/YES*

6.5.1 Effects of Ownership Structure on Stock Liquidity

This section aims to provide the empirical findings for the second research question of this thesis: "does ownership structure influence stock liquidity on the AIM?" To quickly recap, as generally shown in Equation 4.5 (Section 4.4.1), the equation below is the main estimation of the system GMM tested in this study:

$$LIQUI_{it} = \alpha + \kappa_g \sum LIQUI_{it-g} + \beta Ownership_{it} + \gamma C_{it} + \theta X_{it} + \mu i + \varepsilon_{it} \quad (6.1)$$

Where $LIQUI_{it}$ represents the five measures of stock liquidity (quoted bid-ask spread (QBAS), price impact ratio (PIR), turnover ratio (TR), trading volume (TV) and number of trades (NT)), respectively. Note that the numbers of lags included are based on the preliminary results obtained (Table 6.6) for each stock liquidity measure. In particular, three lags are included for the quoted bid-ask spread (QBAS), one for the turnover ratio (TR), trading volume (TV) and number of trades (NT), and no lag is included for the price impact ratio (PIR). $Ownership_{it}$ represents the ownership structure variables, i.e. insider ownership, institutional ownership, number of institutions, significant ownership, substantial ownership and minority shareholders. $Control_{it}$ represents the control variables, i.e. share price (SHR), return volatility (RV), firm size (SIZE), leverage (LV) and firm age (AGE) and analyst following (AF). X_{it} represents the exogenous variables (i.e. firm age and year dummies). *Mi* represents the unobserved fixed effects and ε_{it} represents the error terms.

Table 6.7 presents results for each of the five models tested in Equation 6.1 with five measures of stock liquidity as dependent variables mentioned above. Also, robust standard errors being employed to control for heteroscedasticity and serial correlation.

With regards to the relationship between insider ownership (IO) and informational friction variables, i.e. QBAS and PIR (Table 6.7, Columns 1 and 2), the results indicate that IO has no significant relationship with QBAS, but a positive and significant relationship with PIR at 1% significance level (α_{IO} = 0.019). This is to say the higher the insider ownership, the higher the price impact ratio, i.e. the lower the stock liquidity. For the real friction variables (Columns 3, 4 and 5), IO is found to be insignificant with TR (α_{IO} = 0.007, n.s), whilst IO has a negative and significant relationship with TV and NT at 10% and 5% significance levels (α_{IO} = -0.004 and -0.004, respectively). In other words, the higher the insider ownership, the lower the trading activity, i.e. the lower the stock liquidity.

Overall, based on different measures of stock liquidity, insider ownership is negatively associated with stock liquidity in the AIM. This relationship has been supported by previous studies on the topic (e.g., Chiang and Venkatesh, 1988, Iskandrani et al., 2015, Rubin, 2007, Zhou, 2011). The finding is in line with the adverse selection standpoint, which argues that informed ownership has greater information in comparison to other shareholders, thus asymmetric information arises, which leads to reduced stock liquidity (Easley and O'Hara, 1987, Glosten and Milgrom, 1985, Grossman and Hart, 1986, Kyle, 1985). In other words, insider ownership has access to private information and exercises a great deal of firm control. This can lead to increased information asymmetry. Market makers in turn widen the bid–ask spread in order to lower their expected losses because of their transaction with the informed (insider) shareholders. Thus, stock liquidity is negatively affected (Chiang and Venkatesh, 1988). As a result, ***hypothesis 1***, which states that insider ownership is negatively related to stock liquidity, is accepted for FTSE AIM All-Share firms.

In addition, institutional ownership (ITO) has a significant positive relationship with QBAS at 5% significance level, and a significant negative relationship with TR, TV and NT at 5%, 1% and 1% significance levels respectively. These results suggest that ITO negatively and significantly influences stock liquidity in the AIM. The negative relationship is not in line with most of the previous empirical studies in the US, such as (Brockman et al., 2009, Kini and Mian, 1995, Jennings et al., 2002, Rubin, 2007, Jiang et al., 2011, Fehle, 2004, Zhou, 2011), as well as in the main market of the UK, such as (Iskandrani et al., 2015).[49] However, the negative relationship may give an indication that the roles of institutional shareholders in the AIM may be different from their roles in the main markets of the UK and the US in terms of corporate control. Specifically, AIM firms are small, and the number of shares issued by those firms is mostly not as large as in main markets. Therefore, it is more likely that institutional shareholders will hold a large proportion of AIM firms, which increases their incentives to monitor firm management. Hence, this increases the likelihood that institutional owners can obtain private information about the firms and become informed traders. Another explanation for the negative association (as discussed in Section 3.3.2.2) may be that AIM's relative illiquidity makes it more difficult for institutional shareholders to turn around their positions in

[49] These studies find a positive and significant relationship between institutional ownership and stock liquidity. They argue that the positive relationship is due to institutional investors trading more than other shareholders, i.e. insiders (e.g., Rubin, 2007). Besides this, Coffee (1991) argues that institutional shareholders in the US hardly take action in monitoring the firm's management due to considering liquidity as a higher priority than playing a monitoring role in the corporation. Also, over-regulation is considered the main factor preventing the activism of institutional shareholders.

AIM stocks. This can reduce the trading activity and thus negatively affect stock liquidity. Thus, ***hypothesis 2***, which states that institutional ownership is positively related to stock liquidity, is rejected for FTSE AIM All-Share firms.

This study also uses another proxy of institutional investors: the number of institutions (NITO). NITO significantly and positively affects stock liquidity in the AIM, since it is negatively related to QBAS and PIR (α_{NITO} = -0.006, $p < 0.01$; and α_{NITO} = -0.018, $p < 0.01$, respectively), whilst being positively associated with TR, TV and NT at 1% significance level (α_{NITO} = 0.004, 0.014 and 0.013, respectively). This relationship has been supported by previous studies on the topic (e.g., Liu, 2013, Blume and Keim, 2012). These studies found that number of institutions results in stronger positive impacts on stock liquidity than institutional ownership, i.e. number of institutions has a stronger positive relationship with stock liquidity. The positive relationship may be because a large number of institutions holding shares in a firm may increase the competition between them with regard to monitoring the firm's management and accessing private information. This superior information may then spread among investors and become public in a short time, reducing asymmetric information among external shareholders and improving stock liquidity (Holden and Subrahmanyam, 1992, Mendelson and Tunca, 2004). Thus, ***hypothesis 3***, which states that number of institutions is positively related to stock liquidity, is accepted for FTSE AIM All-Share firms.

Moreover, two variables are used as proxies for ownership concentration: significant ownership (SGO) and substantial ownership (SUBO). SGO has a positive and significant relationship with QBAS and PIR, at 1% and 5% significance levels respectively, and a negative and significant relationship with TR, TV and NT at 10%, 1% and 10% significance levels respectively. Besides this, SUBO was found to be significantly negatively associated with TV and NT (α_{SUBO} = -0.308 and -0.362; $p < 0.05$ and 0.01, respectively). These results suggest that ownership concentration has a negative and significant relationship with stock liquidity in the AIM. These negative relationships have been reported by previous studies in the literature, such as (Brockman et al., 2009, Comerton-Forde and Rydge, 2006, Ginglinger and Hamon, 2012, Heflin and Shaw, 2000, Iskandrani et al., 2015, Jacoby and Zheng, 2010, Næs, 2004, Rubin, 2007, Prommin et al., 2016).

These negative relationships are in line with the adverse selection standpoint, which argues that informed ownership holds a higher proportion of a firm's outstanding shares and has greater information in comparison to other shareholders. Thus, asymmetric information arises, which

leads to reduced stock liquidity (Easley and O'Hara, 1987, Glosten and Milgrom, 1985, Grossman and Hart, 1986, Kyle, 1985). In particular, the literature provides two explanations for the negative relationship between ownership concentration and stock liquidity. The first is related to informational friction, and argues that ownership concentration, e.g. blockholder ownership, often trades on non-public information against non-blockholder ownership. Thus, blockholder ownership negatively influences stock liquidity by increasing the cost of informational friction. The second is related to real friction, and argues that blockholder ownership can influence the real friction component of stock market liquidity (e.g. trading volume and number of trades) by changing/restricting the trading activity of the firm relative to a firm with dispersed ownership. That is, blockholder ownership trades less than non-blockholder ownership, which leads to a reduction in the firm's trading activity and an increase in real friction costs by spreading the real costs over a small number of trades (Brockman et al., 2009). Thus, ***hypothesis 4***, which states that significant ownership is negatively related to stock liquidity, is accepted for FTSE AIM All-Share firms. In addition, ***hypothesis 5***, which states that substantial ownership is negatively related to stock liquidity, is accepted for FTSE AIM All-Share firms.

Furthermore, this study finds that minority shareholders (MINO) have a significant negative relationship with QBAS (α_{MINO} = -0.023; $p < 0.1$) whilst no significant relationship is found with PIR (α_{MINO} = -0.113, n.s). However, it is found to be significantly positively associated with real friction, i.e. TR and NT (α_{MINO} = 0.017 and 0.028; $p < 0.01$ and 0.05, respectively). The results imply that MINO positively affects stock liquidity in the AIM. This is in line with the argument that minority shareholders only possess a small stake in the company; therefore, it is difficult and/or there is probably no sufficient incentive for them to monitor and control firm management (Ragazzi, 1981). Therefore, those minor shareholders may not get access to a firm's inside information and are uninformed. Thus, ***hypothesis 6***, which states that minority shareholders are positively associated with stock liquidity, is accepted for FTSE AIM All-Share firms.

Regarding the controlling variables of this study (share price, return volatility, firm size, financial leverage and firm age), those variables were found to have the same influence on stock liquidity as obtained/discussed in the previous empirical chapter (Section 5.5.1, Table 5.7). In other words, share price and firm size have significant positive relationships with stock liquidity. In contrast, return volatility and firm age have significant negative relationships with

stock liquidity. As discussed in Section 5.5.1, these findings are in line with prior studies in the literature, such as (Stoll, 2000). Financial leverage however, was found to have no significant relationship with all stock liquidity variables. Finally, analyst following (AF) has a positive and significant association with stock liquidity in the AIM, since it has a significant negative relationship with QBAS and PIR at 1% and 10% significance levels respectively, and a positive and significant relationship with TR, TV and NT at 5%, 1% and 1% significance levels respectively. The positive relationship has been reported by prior studies in the literature, such as (Brennan and Subrahmanyam, 1995, Roulstone, 2003, Zhou, 2011, Staglianò et al., 2018). This positive relationship is consistent with the argument that analyst following is able to engage in the production of non-public information and disclose superior or private information held by the managers (Healy and Palepu, 2001). Therefore, more analyst following can lead to deeper stock markets due to improved competition among informed agents, hence improved stock liquidity (Brennan and Subrahmanyam, 1995).

Regarding the results for the four specification tests related to the system GMM (i.e. the first serial correlation (AR(1)), second serial correlation (AR(2)), Hansen test and differences in Hansen test), the null hypothesis that there is no serial correlation is accepted. This is because AR(1) is statistically significant at 1% significance level whilst AR(2) shows insignificant results for all models. In addition, the Hansen tests and differences in Hansen tests for all models are not significant. Therefore, it can be concluded that the employed instrumental variables are valid and are exogenous.

Table 6. 7 Effects of Ownership Structure on Stock Liquidity

The table below reports the results of the system GMM using quoted bid–ask spread (QBAS) and price impact ratio (PIR) as proxies for informational friction and turnover ratio (TR), and trading volume (TV) and number of trades (NT) as proxies for real friction. The independent variables are the ownership structure variables: insider ownership (IO), institutional ownership (ITO), number of institutions (NITO), substantial ownership (SUBO), significant ownership (SGO) and minority shareholders (MINO). The control variables are share price (SHP), return volatility (RV), firm size (SIZE), financial leverage (LV), firm age (AGE) and analyst following (AF). Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively. P-values of AR (1) are test for first order serial correlation and AR (2) are for second order serial correlation, under the null hypothesis of no serial correlation. P-values of the Hansen test of over-identification are under the null hypothesis that all instrumental variables are valid. P-values of the difference in Hansen test of exogeneity are under the null hypothesis that instrumental variables employed in levels are exogenous.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	QBAS	PIR	TR	TV	NT
IO	-0.004	0.019***	0.007	-0.004*	-0.004**
	(-0.71)	(4.02)	(0.68)	(-1.77)	(-2.12)
ITO	0.016**	0.064	-0.029**	-0.050***	-0.070***
	(2.08)	(1.61)	(-2.40)	(-2.80)	(-3.58)
NITO	-0.006***	-0.018***	0.004***	0.014***	0.013***
	(-9.25)	(-4.44)	(3.43)	(7.76)	(6.60)
SUBO	0.034	0.150	-0.076	-0.308**	-0.362***
	(0.77)	(0.65)	(-1.03)	(-2.37)	(-2.85)
SGO	0.070***	0.317**	-0.033*	-0.231***	-0.121*
	(3.09)	(2.21)	(-1.77)	(-3.31)	(-1.76)
MINO	-0.023*	-0.113	0.017***	0.089	0.028**
	(-1.68)	(-0.78)	(2.63)	(1.00)	(2.36)
SHP	-0.075***	-1.353***	0.130***	1.031***	0.246***
	(-5.18)	(-17.16)	(4.16)	(17.95)	(4.64)
RV	-0.009	0.001***	-0.022	-0.039	-0.063**
	(-0.70)	(10.54)	(-1.24)	(-1.36)	(-2.01)
SIZE	-0.198***	-0.055	-0.009	0.554***	0.403***
	(-8.14)	(-0.47)	(-0.24)	(7.99)	(5.65)
LV	-0.006	-0.007	0.039	0.016	-0.036
	(-0.37)	(-0.07)	(1.63)	(0.40)	(-0.76)
AGE	0.042	-0.175	-0.097*	-0.344***	-0.199
	(0.90)	(-0.78)	(-1.89)	(-2.72)	(-1.53)
AF	-0.018***	-0.035*	0.012**	0.040***	0.035***
	(-4.58)	(-1.79)	(2.22)	(3.74)	(4.27)
LIQUI-1	2.855***	-	25.36***	0.000**	0.000***
	(5.27)		(2.83)	(1.97)	(2.68)
LIQUI-2	-1.510***	-	-	-	-
	(-3.69)				
LIQUI-3	0.346	-	-	-	-
	(1.03)				
Constant	-2.501***	-6.668***	-5.105***	9.145***	3.576***
	(-12.96)	(-5.44)	(-15.09)	(14.09)	(6.04)
Observations	1,998	1,993	1,932	1,993	1,993
AR(1) test	0.000	0.000	0.000	0.000	0.000
AR(2) test	0.103	0.107	0.116	0.199	0.214
Hansen test of over-identification	0.632	0.154	0.112	0.118	0.226
Diff in Hansen tests of exogeneity	0.699	0.451	0.157	0.345	0.477

Overall, the system GMM estimator has indicated that firms listed on the AIM with higher insider ownership, institutional ownership and ownership concentration tend to exhibit lower stock liquidity. In contrast, firms with higher minority shareholders and number of institutions tend to exhibit higher stock liquidity. These findings are consistent across different measures of stock liquidity. In the following section, this study will provide a number of robustness checks, i.e. the use of alternative measures of stock liquidity, controlling for trading activity and adding more control variables to confirm the findings obtained in this section.

6.6 Robustness Check

After conducting the main analysis using the system GMM, three additional tests will be carried out as robustness checks to confirm the findings obtained in Section 6.5.1. The first test re-examines the main investigated effects of ownership structure on two additional measures of stock liquidity. Those two measures are quoted depth and market quality index. In the second test, the relationship between ownership structure and informational friction variables, i.e. QBAS and PIR, is re-examined by controlling for trading activity, i.e. trade size. In the third test, the main model is tested by adding additional control variables: research and development expenses and dividend payout ratio.

6.6.1 Quoted Depth and Market Quality Index

As discussed in Section 5.6.1, both market quality index (MQI) and quoted depth (QDP) are employed as proxies for stock liquidity. Table 6.8 shows the results for the relationship between ownership structure and MQI and QDP. In general, the results are consistent with those obtained in the main analysis (Section 6.5.1, Table 6.7), such that higher insider ownership, institutional ownership and ownership concentration can reduce stock liquidity, whereas higher minority shareholders and number of institutions tend to improve stock liquidity. In detail, insider ownership (IO) has a significant negative relationship with QDP (α_{IO} = -0.004, $p < 0.1$). Besides this, institutional ownership (ITO) has a significant negative relationship with both MQI and QDP (α_{ITO} = -0.074, $p < 0.01$ and -0.038, $p < 0.05$, respectively). Also, significant ownership (SGO) (substantial ownership (SUBO)) has a significant negative relationship with both MQI and QDP at 1% significance level (at 5% significance level). These results imply that insider ownership, institutional ownership and ownership concentration negatively affect stock liquidity in the AIM.

In contrast, number of institutions (NITO) has a significant positive relationship with both MQI and QDP at 1% significance level. Minority shareholders (MINO) also have a significant positive relationship with both MQI and QDP (α_{MINO} = 0.034 and 0.029; $p < 0.05$, respectively). These results imply that number of institutions and minority shareholders positively affect stock liquidity in the AIM.

Given the above, after examining the relationship between ownership structure and stock liquidity using two additional proxies of stock liquidity – MQI and QDP – the results remain unchanged. This adds to the robustness and validity of the main findings.

Table 6. 8 Effects of Ownership Structure on MQI and QDP

The table below reports the results of the system GMM for the relationship between ownership structure and both market quality index (MQI) and quoted depth (QDP). The definitions of variables, as well as the four system GMM tests – AR (1), AR (2), Hansen test of over-identification and difference in Hansen test of exogeneity – are as in Table 6.7. Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

VARIABLES	(1) MQI	(2) QDP
IO	-0.003	-0.004*
	(-1.16)	(-1.90)
ITO	-0.074***	-0.038**
	(-2.95)	(-2.20)
NITO	0.019***	0.011***
	(8.36)	(5.23)
SUBO	-0.337**	-0.289**
	(-1.98)	(-2.25)
SGO	-0.263***	-0.208***
	(-2.75)	(-3.03)
MINO	0.034**	0.029**
	(2.08)	(2.44)
SHP	0.004	0.194*
	(0.03)	(1.69)
RV	-0.000	-0.000***
	(-1.31)	(-2.92)
SIZE	0.834***	0.558***
	(9.38)	(10.27)
LV	0.048	0.024
	(0.86)	(0.59)
AGE	-0.341**	-0.301***
	(-2.10)	(-3.02)
AF	0.064***	0.039***
	(4.26)	(3.76)
LIQUI-1	0.000***	0.000**
	(3.43)	(2.44)
LIQUI-2	-	-
LIQUI-3	-	-
Constant	10.97***	8.504***
	(13.07)	(14.65)
Observations	2,006	2,004
AR(1) test	0.000	0.000
AR(2) test	0.679	0.106
Hansen test of over-identification	0.161	0.229
Diff in Hansen tests of exogeneity	0.548	0.495

6.6.2 Informational Friction Variables and Trading Activity

Previous studies in the literature have controlled for trading activity of stock markets whilst examining the relationship between ownership structure and informational friction variables. For instance, Brockman et al. (2009) find a positive relationship between blockholder ownership and quoted bid-ask spread in the US. However, after controlling for trading activity, they report that blockholder ownership has an insignificant relationship with the quoted bid-ask spread. In contrast, Iskandrani et al. (2015) find a positive relationship between blockholder ownership and quoted bid-ask spread in the UK. Even after controlling for trading activity, the positive relationship still exists. This study in turn controls for trading activity (trade size) with two informational friction variables: quoted bid-ask spread (QBAS) and price impact ratio (PIR). Trade size is one of the most-used trading activity variables in prior studies in the literature. It is calculated by dividing trading volume by number of trades as suggested by previous studies, such as (Brockman et al., 2009, Heflin and Shaw, 2000, Jacoby and Zheng, 2010).

Table 6.9 shows the results for the effects of ownership structure on the informational friction variables (QBAS and PIR) after controlling for trade size (TS). In general, the results are consistent with those obtained in the main analysis (Table 6.7), such that higher insider ownership, institutional ownership and ownership concentration can reduce stock liquidity, whereas higher minority shareholders and number of institutions tend to improve stock liquidity. In detail, insider ownership (IO) has a significant positive relationship with PIR, at 1% significance level. Both institutional ownership (ITO) and significant ownership (SGO) have a significant positive relationship with QBAS and PIR at 1% and 5% significance levels respectively. In contrast, number of institutions has a significant negative relationship with both QBAS and PIR at 1% significance level. Minority shareholders (MINO) have a significant negative relationship with QBAS at 10% significance level.

Given the above, after examining the relationship between ownership structure and informational friction variables (QBAS and PIR) using an additional control variable, trade size (TS), the results remain unchanged. This adds to the robustness and validity of the main findings.

Table 6. 9 Effects of Ownership Structure on Informational Friction Variables

The table below reports the results of the system GMM for the relationship between ownership structure and the informational friction variables of quoted bid–ask spread (QBAS) and price impact ratio (PIR) by controlling for trading activity (trade size (TS)). The definitions of variables, as well as the four system GMM tests – AR (1), AR (2), Hansen test of over-identification and difference in Hansen test of exogeneity – are as in Table 6.7. Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

VARIABLES	(1) QBAS	(2) PIR
IO	-0.005	0.018***
	(-0.73)	(3.67)
ITO	0.020***	0.083**
	(3.02)	(2.48)
NITO	-0.005***	-0.018***
	(-9.42)	(-4.97)
SUBO	0.034	0.147
	(0.87)	(0.61)
SGO	0.071***	0.339**
	(2.87)	(2.19)
MINO	-0.019*	-0.111
	(-1.79)	(-0.84)
SHP	-0.087***	-1.441***
	(-4.70)	(-16.75)
RV	-0.009	0.001***
	(-0.71)	(11.00)
SIZE	-0.206***	-0.125
	(-8.25)	(-1.01)
LV	-0.008	-0.031
	(-0.56)	(-0.32)
AGE	0.061	-0.260
	(1.30)	(-1.16)
AF	-0.018***	-0.034*
	(-4.56)	(-1.65)
TS	-0.000**	0.000
	(-2.08)	(1.30)
LIQUI-1	2.423***	-
	(4.58)	
LIQUI-2	-1.392***	-
	(-3.24)	
LIQUI-3	0.455	-
	(1.41)	
Constant	-2.466***	-6.682***
	(-13.29)	(-5.53)
Observations	1,998	1,993
AR(1) test	0.000	0.000
AR(2) test	0.124	0.106
Hansen test of over-identification	0.724	0.340
Diff in Hansen tests of exogeneity	0.707	0.219

6.6.3 Additional Control Variables

In the main analysis (Table 6.7), this study controls for share price, return volatility, firm size, financial leverage and firm age. These control variables, as suggested by prior studies in the literature, are considered the most common variables affecting the relationship between ownership structure and stock liquidity. In addition to these control variables, this study controls for research and development expenditures (R&D) and dividend payout ratio (DPR). Previous studies have argued that research and development expenses can be a channel towards asymmetric information (Aboody and Lev, 2000, Zeckhauser and Pound, 1990, Chung et al., 2010). These studies mention that firms spending on research and development have more asymmetric information problems due to the difficulty of predicting the payoffs from the R&D. Thus, it is expected that research and development expenditures be negatively related to stock liquidity.

With regards to the dividend payout ratio[50], prior studies have argued that dividend policy may be related for both ownership and the stock liquidity of the market. For instance, there is a positive relationship between institutional ownership and dividend payout, whereas there is a negative relationship between insider ownership and dividend payout (Short et al., 2002). Besides this, illiquid stock holders (e.g. concentrated ownerships) might prefer dividends to fulfil cash demands instead of selling shares and suffering from high transaction costs (Michaely and Qian, 2017). Regarding the relationship between dividend payout and stock liquidity, prior studies have found a negative association between dividend payout ratio and stock liquidity (e.g., Murray, 1985, Banerjee et al., 2007). The negative relationship can be attributed to (1) the firm value's sensitivity to aggregate liquidity decreases after dividends, which suggests that shareholders view the liquidity of stock market and dividends as substitutes, and (2) the fact that dividends may allow shareholders to meet their liquidity needs with less or no trading (Banerjee et al., 2007).

Table 6.10 shows the results of the relationship between ownership structure and stock liquidity, with informational friction variables (QBAS and PIR) and real friction variables (TR, TV and NT), controlling for the additional control variables of research and development expenses (R&D) and dividend payout ratio (DPR). In general, the results are consistent with the findings of the main analysis (Table 6.7), such that higher insider ownership, institutional

[50] Following the literature, dividend payout ratio is defined as the fraction of income a company pays to its investors in dividends. It is calculated as dividends / net income.

ownership and ownership concentration can reduce stock liquidity, whereas higher minority shareholders and number of institutions tend to improve stock liquidity.

In detail, it is apparent that insider ownership has a significant positive relationship with PIR at 5% significance level (α_{IO} = 0.012) and a significant negative relationship with TV and NT at 10% significance level (α_{IO} = -0.004 and -0.003). Besides this, institutional ownership has a significant positive relationship with QBAS and PIR at 5% and 10% significance levels and a significant negative relationship with TR, TV and NT at 5%, 1% and 1% significance levels respectively. Also, significant ownership is found to be significantly positively associated with QBAS and PIR (α_{SGO} = 0.072 and 0.343; $p < 0.01$, respectively) and significantly negatively related to TR and TV (α_{SGO} = -0.029 and -0.246; $p < 0.1$ and 0.01, respectively). Besides this, substantial ownership has a significant negative relationship with TV and NT at 1% significance level. These results imply that insider ownership, institutional ownership and ownership concentration negatively affect stock liquidity in the AIM.

In contrast, number of institutions has a significant negative relationship with QBAS and PIR at 1% significance level and a significant positive relationship with TR, TV and NT at 1% significance level. Besides this, minority shareholders have a significant negative relationship with QBAS at 10% significance level and a significant positive relationship with TR and NT at 1% significance level. These results imply that number of institutions and minority shareholders positively affect stock liquidity in the AIM.

Finally, both R&D and DPR have a negative and significant relationship with stock liquidity in the AIM. For instance, R&D has a significant positive relationship with QBAS at 1% significance level and a significant negative relationship with TV and NT at 5% and 10% significance levels respectively. DPR has a significant positive relationship with PIR at 1% significance level and a significant negative relationship with TV and NT at 10% and 5% significance levels respectively.

Given the above, after examining the relationship between ownership structure and stock liquidity using two additional control variables – R&D and DPR – the results remain unchanged. This adds to the robustness and validity of the main findings.

Table 6. 10 Ownership Structure and Stock Liquidity: Additional Variables R&D & DPR

The table below reports the results of the system GMM for the relationship between ownership structure and stock liquidity when adding the controlling variables of research and development expenditures (R&D) and dividend payout ratio (DPR). Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	QBAS	PIR	TR	TV	NT
IO	-0.009	0.012**	0.006	-0.004*	-0.003*
	(-1.38)	(2.45)	(0.59)	(-1.66)	(-1.77)
ITO	0.014**	0.057*	-0.030**	-0.047***	-0.074***
	(2.12)	(1.67)	(-2.48)	(-3.11)	(-3.91)
NITO	-0.006***	-0.013***	0.005***	0.013***	0.013***
	(-9.13)	(-4.34)	(3.76)	(8.75)	(6.90)
SUBO	0.052	0.204	-0.072	-0.313***	-0.342***
	(1.46)	(0.82)	(-0.97)	(-2.82)	(-3.27)
SGO	0.072***	0.343***	-0.029*	-0.246***	-0.076
	(2.69)	(2.62)	(-1.68)	(-3.96)	(-1.22)
MINO	-0.030*	-0.114	0.018***	0.088	0.032***
	(-1.82)	(-1.07)	(2.71)	(0.99)	(3.20)
SHP	-0.081***	-1.201***	0.129***	0.993***	0.214***
	(-4.87)	(-16.14)	(4.09)	(18.19)	(4.30)
RV	0.002	0.001***	-0.030	-0.030	-0.045
	(0.22)	(11.07)	(-1.45)	(-1.00)	(-1.50)
SIZE	-0.203***	-0.245**	-0.010	0.576***	0.407***
	(-9.44)	(-2.28)	(-0.26)	(8.56)	(6.09)
LV	-0.009	-0.127	0.031	0.030	-0.014
	(-0.58)	(-1.56)	(1.21)	(0.81)	(-0.35)
AGE	0.020	-0.324	-0.109**	-0.275**	-0.104
	(0.37)	(-1.31)	(-2.01)	(-2.32)	(-1.01)
AF	-0.013***	-0.024	0.011**	0.030***	0.033***
	(-3.16)	(-1.35)	(2.13)	(3.52)	(3.78)
R&D	0.012***	-0.002	-0.001	-0.019**	-0.002*
	(2.62)	(-0.12)	(-0.94)	(-2.14)	(-1.72)
DPR	-0.004	0.136***	0.003	-0.014*	-0.024**
	(-1.11)	(7.02)	(0.50)	(-1.75)	(-2.41)
LIQUI-1	3.193***	-	25.31***	0.000**	0.000**
	(5.95)		(2.83)	(2.30)	(2.50)
LIQUI-2	-1.535***	-	-	-	-
	(-4.07)				
LIQUI-3	0.363	-	-	-	-
	(1.16)				
Constant	-2.390***	-4.388***	-5.082***	8.472***	2.717***
	(-9.80)	(-3.61)	(-14.99)	(12.72)	(4.75)
Observations	1,998	1,993	1,932	1,993	1,993
AR(1) test	0.000	0.000	0.000	0.000	0.000
AR(2) test	0.153	0.117	0.137	0.165	0.135
Hansen test of over-identification	0.594	0.234	0.119	0.405	0.561
Diff in Hansen tests of exogeneity	0.892	0.531	0.134	0.145	0.563

6.7 Summary

In the second empirical research of this thesis, the main objective was to examine the association of ownership structure and stock liquidity of AIM firms from 2010 to 2016. As stated in the literature review, none of the previous studies have conducted their investigations in the AIM. As a result, this study has contributed to the literature by studying an important topic in finance in an emerging, growing stock market which is one of the most successful in the world. Regarding the methodology, the study employs different components of ownership structure, i.e. insider ownership, institutional ownership, number of institutions, significant ownership, substantial ownership and minority shareholders, together with various measures of stock liquidity (both informational and real frictions). Besides this, the main method of the study is the system GMM, which can take into account different sources of endogeneity problems.

Based on the results of the main tests, the findings obtained indicate that firms listed on the AIM with higher insider ownership, institutional ownership and ownership concentration tend to exhibit lower stock liquidity. In contrast, firms with higher minority shareholders and number of institutions tend to exhibit higher stock liquidity. Furthermore, these results hold up even after employing three robustness checks, i.e. the use of alternative measures of stock liquidity, controlling for trading activity and adding more control variables.

Chapter 7 Ownership Identity and Stock Liquidity

7.1 Introduction

Prior studies indicate that institutional shareholders is considered an important mechanism in monitoring firm managers and reducing agency problems (Bhide, 1993, Shleifer and Vishny, 1997, Ginglinger and Hamon, 2012). However, not all types of institutional ownership can monitor firm management, due to their differences in levels of concentration (Næs, 2004, Jennings et al., 2002), fiduciary responsibilities and investment horizons (Chung and Zhang, 2011), behaviours (Coffee, 1991), and carrying the monitoring costs (Almazan et al., 2005). As a result, the effects of different ownership identities on stock liquidity vary from one to another (Chung and Zhang, 2011, Jennings et al., 2002, Fehle, 2004). For instance, Barabanov and McNamara (2002) found that investment firms and independent advisers have stronger adverse correlations with bid–ask spread compared to banks and insurance companies.

Based on the above explanations, some identities that are able to control the managers may obtain superior information, allowing them to trade on this at expense of the uninformed identities. This may lead to asymmetric information and therefore a reduction in stock liquidity (Easley and O'Hara, 1987, Glosten and Milgrom, 1985, Grossman and Hart, 1986, Kyle, 1985). In contrast, uninformed or liquidity-motivated identities may repeatedly turn over their portfolios, which may reduce transaction costs and therefore positively influence stock liquidity (Merton, 1987, Demsetz, 1968, Schwartz and Shapiro, 1992).

Prior studies of the relationship between ownership identity and stock liquidity were conducted in the US market (Jennings et al., 2002, Barabanov and McNamara, 2002, Fehle, 2004, Poon et al., 2013, Liu, 2013), France (Ginglinger and Hamon, 2012, Ajina et al., 2015) and emerging stock markets (Ding et al., 2017, Lee and Chung, 2018, Rhee and Wang, 2009, Tran et al., 2018). Although very few studies were conducted in the main market of the UK (e.g., Park, 2009), the AIM is ignored.

As discussed in Section 2.6, the composition of ownership identity for the AIM is found to be different from the main market of the UK (ONS, 2015). For instance, individual investors held about 30.6% and 29.7% of AIM shares in 2014 and 2016 respectively, whereas these individual investors held only 9.5% in the same periods on the FTSE 100 (ONS, 2017). Besides this, although the minimum percentage of the free float shares for the main market of the UK is 25%

for local firms and 50% for international firms (FTSE, 2019, p. 14), there is no limited/minimum percentage for the free float in the AIM (LSE, 2015b). This may indicate that the levels of free float in the AIM may be different from the main market and among AIM firms themselves. The two differences, i.e. the composition of ownership identity and levels of free float, can provide more motivation to investigate the role of ownership identity in the AIM, the most successful growth market in the world. This study employs a comprehensive set of different ownership identities, i.e. free float ownership, investment bank ownership, foreign ownership, government ownership, pension fund ownership, employee ownership, cross-holding ownership and other-holding ownership and investigates their effects on stock liquidity.

This chapter starts by providing the hypothesis development of the study. Subsequently, descriptive statistics will be provided and discussed. Following this, findings on the empirical analysis of the association between ownership identity and stock liquidity, as well as the robustness check, will be presented.

7.2 Hypothesis Development

To proceed to the hypothesis development of this study, both theoretical and empirical studies on the linkages between ownership identity (free float ownership, investment bank ownership, foreign ownership, government ownership, pension fund ownership, employee ownership, cross-holding ownership and other-holding ownership) and stock liquidity are taken into account. To avoid repetition, detailed information about those identities was discussed from Section 3.3.3 to Section 3.3.3.6.

In brief, free float shareholders can affect stock liquidity by changing the firm's trading activity. Specifically, when a firm has more blockholders, its free float shares will decrease. Thus, the number of shareholders will be lower than a firm owned by small shareholders, leading to lower trading activity and stock liquidity. In this regard, Ciner and Karagozoglu (2008) indicate that firms with lower free float shares tend to have more problems with asymmetric information. Limited studies have empirically examined the impacts of free float ownership on stock liquidity (e.g., Park, 2009, Ginglinger and Hamon, 2012, Ding et al., 2016). These studies found a positive relationship between free float ownership and stock liquidity. Consequently, the following hypothesis will be tested:

Hypothesis 1: Free float ownership is positively related to stock liquidity.

In addition to free float ownership, bank ownership may monitor firms' corporate policies, as well as attempting to have representation on the board to intervene in the investment decisions of the firms (Prowse, 1990). Besides this, bank ownership has more ability than other identities to monitor managers, since banks are able to carry the costs of becoming knowledgeable about their client companies (Hoshi et al., 1991). The monitoring role of these banks can in turn allow them access to private information about the firms, which can increase asymmetric information. Empirically, bank ownership has been found to have mixed results. For instance, both a positive relationship between bank ownership and stock liquidity (Barabanov and McNamara, 2002, Jennings et al., 2002, Poon et al., 2013) and a negative association between bank ownership and stock liquidity (Park, 2009, Liu, 2013, Fehle, 2004) have been observed. As a result, the following hypotheses will be tested:

Hypothesis 2a: Investment bank ownership is positively related to stock liquidity.

Hypothesis 2b: Investment bank ownership is negatively related to stock liquidity.

Another aspect of ownership identity is the foreign ownership. Some prior studies have argued that foreign owners may possess stronger ability to monitor firm management compared to domestic owners (Khanna and Palepu, 1999), and therefore foreigners are considered more informed than local ownership, since they better understand the relevant fundamentals compared to domestic shareholders (Froot et al., 2008). In contrast, other studies have argued that the performance of local investors is better than that of foreigners, since the latter have lower trading profit (Hau, 2001, Dvořák, 2005). Empirically, foreign ownership found to have mixed results. For instance, both a positive relationship between foreign ownership and stock liquidity (Dahlquist and Robertsson, 2001, Næs, 2004, Ding et al., 2017, Lee and Chung, 2018) and a negative association between foreign ownership and stock liquidity (Deng et al., 2018, Rhee and Wang, 2009, Park, 2009) have been reported. As a result, the following hypotheses will be tested:

Hypothesis 3a: Foreign ownership is positively related to stock liquidity.

Hypothesis 3b: Foreign ownership is negatively related to stock liquidity.

Whilst existing studies have paid extensive focus to foreign ownership and its relationship with stock liquidity, government ownership has received relatively little attention in the literature. Some studies indicate that the control–ownership separation negatively impacts stock liquidity, and this adverse effect is worsened by poorer shareholder protection and government ownership (Chu et al., 2015). Besides this, some studies argue that government ownership is associated with more agency problems between majority and minority shareholders and information asymmetry (Shleifer and Vishny, 1997, Chu et al., 2015, Tran et al., 2018). Limited studies have empirically examined the impacts of government ownership on stock liquidity (Tran et al., 2018, Park, 2009, Næs, 2004). These studies have found a negative relationship between government ownership and stock liquidity. Consequently, the following hypothesis will be tested:

Hypothesis 4: Government ownership is negatively related to stock liquidity.

Furthermore, it has been argued by the literature that pension funds are active traders and tend to have strong incentives to involve themselves in the process of firm monitoring (Dittmar and Mahrt-Smith, 2007, Officer, 2011). For instance, Cremers and Nair (2005) find that portfolios comprising firms with high pension fund ownership may yield abnormal returns of 10–15%. Moreover, Guercio and Hawkins (1999) indicate that pension fund ownership is relatively free from corporate pressure and conflicts of interest compared to other institutional ownership. They are considered aggressive activists (Barber, 2006). They manage a great number of firm assets, which can contribute to the reduction of transaction costs, thus enhancing stock liquidity (Ajina et al., 2015). Empirically, pension funds have been found to have mixed results. For instance, both a positive relationship between pension funds and stock liquidity (e.g., Poon et al., 2013, Ajina et al., 2015) and a negative association between pension funds and stock liquidity (e.g., Park, 2009) have been recorded. As a result, the following hypotheses will be tested:

Hypothesis 5a: Pension fund ownership is positively related to stock liquidity.

Hypothesis 5b: Pension fund ownership is negatively related to stock liquidity.

Among the mentioned ownership identities, very few studies focus on employee ownership and its relationships with stock liquidity. Employee benefit plans have been found to lower employee turnover and increase productivity, which in turn increases the profits of the firm (Livingston and Henry, 1980). These plans, which tie employee payoffs to the firm's

performance, can (1) provide incentive contracts that contribute to align the interests of employees with managers and (2) provide greater participation in decision making (O'Boyle et al., 2016). A limited number of studies have empirically examined the impacts of employee ownership on stock liquidity (Brockman et al., 2009, Park, 2009). These studies find a negative relationship between employee ownership and stock liquidity. Consequently, the following hypothesis will be tested:

Hypothesis 6: Employee ownership is negatively related to stock liquidity.

The relationship between cross-holding ownership and stock liquidity has also received little attention in the literature. Crossholdings may increase the potential of mergers and acquisitions, as well as changing decision-making processes and corporate strategies due to their information advantages (Brooks et al., 2018). Empirically, a negative relationship between cross-holding ownership and stock liquidity is found by Park (2009). Consequently, the following hypothesis will be tested:

Hypothesis 7: Cross-holding ownership is negatively related to stock liquidity.

Finally, other-holding ownership can be any other identity not mentioned above. We develop two hypotheses for this type, as follows:

Hypothesis 8a: Other-holding ownership is positively related to stock liquidity.

Hypothesis 8b: Other-holding ownership is negatively related to stock liquidity.

7.3 Descriptive Statistics

The current section aims at providing the descriptive statistics of the components of ownership identity variables, i.e. free float ownership, investment bank ownership, foreign ownership, government ownership, pension fund ownership, employee ownership, cross-holding ownership and other-holding ownership (Table 7.1). Subsequently, the average of those ownership identities across years and across industries are revealed in Tables 7.2 and 7.3, respectively.

Free float shareholders have a mean value of 64.8%, standard deviation (SD) of 22%, minimum value of 0%, and maximum value of 100%. Investment bank ownership has a mean value of 7.3%, SD of 10.6%, minimum value of 0% and maximum value of 78%. Foreign ownership

(with government ownership figures in parentheses) has a mean value of 16.2% (0.17%), SD of 18.7% (2.5%), minimum value of 0% (0%), and maximum value of 100% (64.8%). pension fund ownership has a mean value of 0.3%[51], SD of 4%, minimum value of 0%, and maximum value of 83%. The mean value of employee ownership is 17.9% and the SD is 19.4%, whilst the minimum value is 0% and the maximum value is 90%. Cross-holding ownership has a mean value of 9%, SD of 15%, minimum value of 0% and a maximum value of 87%. Other-holding ownership has a mean value of 0.4% and a maximum value of 71%.

Table 7. 1 Descriptive Statistics

The table below presents the descriptive statistics for ownership identity and includes, means, medians, standard deviations (SD), minimum, percentiles and maximum during the period from 2010 to 2016 for AIM firms. The ownership identity variables are free float ownership (FFO), investment bank ownership (IBO), foreign ownership (FOO), government ownership (GO), pension fund ownership (PFO), employee ownership (EO), cross-holding ownership (CHO) and other-holding ownership (OHO).

Variable	Mean	Median	SD	Min	P25	P75	Max
FFO (%)	64.84	66.00	22.03	0.000	49.00	83.00	100.0
IBO (%)	7.329	0.000	10.64	0.000	0.000	11.00	78.00
FOO (%)	16.22	10.00	18.74	0.000	0.000	25.00	100.0
GO[52] (%)	0.178	0.000	2.557	0.000	0.000	0.000	64.83
PFO (%)	0.315	0.000	4.023	0.000	0.000	0.000	83.00
EO (%)	17.98	12.00	19.44	0.000	0.000	29.00	90.00
CHO (%)	9.022	0.000	15.09	0.000	0.000	13.00	87.00
OHO (%)	0.491	0.000	4.469	0.000	0.000	0.000	71.00

Table 7.2 and Table 7.3 provide the average of AIM firms' ownership identity variables across the investigated period from 2010 to 2016, and across industries, respectively. Intriguingly, foreign ownership (FOO) reveals a continuous increasing trend over time from 8.1% in 2010 to 19.7% in 2016. This is in line with our discussion in Section 2.2 that AIM is considered a worthy investment pool for foreign capital. Besides this, investment bank ownership has increased slightly from 6.7% in 2010 to 8.7% in 2016. In contrast, employee ownership (EO) reveals a continuous decreasing trend over time from 19.2% in 2010 to 16.5% in 2016. Free float ownership (FFO) has been steady over the years.

[51] The low percentage of the pension funds in the AIM may be because they tend to shun away from stocks of a high volatility profile such the AIM.

[52] Because the ownership of government (GO), pension funds (PFO) and other holdings (OHO) are minimal, we run two regressions for the relationship between ownership identity and stock liquidity. The first one includes all the ownership identity variable whereas the second one ignores the ownership of government (GO) pension funds (PFO) and other holdings (OHO) are minimal (more details for the second test are provided in Appendix C).

Moreover, 2013 has the highest percentage of both government ownership and pension fund ownership with an average 0.31% and 0.42% respectively, whereas 2010 has the lowest percentage of government ownership and pension fund ownership with an average of 0.01% and 0.17% respectively. Finally, the largest percentage of cross-holding ownership (other-holding ownership) is in 2015 (2016) with an average of 9.6% (0.57%), whereas the lowest percentage of cross-holding ownership (other-holding ownership) is in 2012 (2010) with an average of 8.4% (0.35%).

Table 7. 2 Means of the Ownership Identity Variables for Each Year (2010–2016)

	2010	2011	2012	2013	2014	2015	2016	Total
FFO (%)	64.26	**65.70**	65.55	64.66	64.62	**64.15**	65.07	64.84
IBO (%)	6.743	6.551	**6.545**	6.856	7.322	7.949	**8.783**	7.329
FOO (%)	**8.171**	9.704	16.68	18.03	18.61	19.46	**19.76**	16.22
GO (%)	**0.011**	0.236	0.107	**0.318**	0.253	0.235	0.032	0.178
PFO (%)	**0.173**	0.418	0.289	**0.421**	0.345	0.294	0.267	0.315
EO (%)	**19.23**	18.27	18.61	18.62	17.89	17.34	**16.50**	17.98
CHO (%)	9.080	8.641	**8.452**	9.113	9.381	**9.638**	8.725	9.022
OHO (%)	**0.353**	0.493	0.534	0.436	0.465	0.523	**0.579**	0.491

According to Table 7.3, it is apparent that the highest percentage of free float ownership is in Oil & Gas, with an average of 70.8%, whereas the lowest percentage of free float ownership is in Telecommunications, with an average of 57.5%. The highest percentage of investment bank ownership is in Health Care, with an average of 9.4%, whereas the lowest percentage of investment bank ownership appears in Oil & Gas, with an average of 3.8%. Utilities has the highest percentage of foreign ownership with an average of 29.2%, whilst Industrials has the lowest percentage of foreign ownership with an average of 12.9%. The rest of the descriptive statistics are outlined in Table 7.3.

Table 7. 3 Means of the Ownership Identity Variables for Each Industry

Variable	Basic Materials	Utilities	Telecommunications	Consumer Goods	Consumer Services	Health Care	Oil & Gas	Industrials	Technology
FFO (%)	69.13	64.91	**57.59**	63.54	58.31	70.52	**70.86**	60.19	61.73
IBO (%)	4.471	5.409	8.028	6.655	9.183	**9.406**	**3.843**	7.747	11.62
FOO (%)	18.03	**29.24**	29.00	15.45	16.65	14.70	18.86	**12.93**	14.71
GO (%)	0.292	**0.000**	**1.487**	**0.000**	**0.000**	0.475	0.015	0.220	**0.000**
PFO (%)	**1.084**	**0.000**	**0.000**	0.183	0.037	0.629	0.047	**0.000**	0.103
EO (%)	**12.01**	14.71	12.61	15.50	**25.04**	12.61	13.84	23.98	22.10
CHO (%)	13.18	14.97	**19.74**	12.44	6.638	5.551	11.23	7.587	**4.327**
OHO (%)	0.593	**0.000**	0.536	**1.668**	0.312	1.283	0.152	0.265	0.112

7.4 Correlation Matrix

As previously discussed in Section 4.4.2 regarding the multicollinearity issue, there are two common tests for multicollinearity, namely correlation and VIF. Firstly, the correlation matrix is presented in Table 7.4 to reveal the correlation variables included in the studies, i.e. ownership identity, stock liquidity and controlling variables. Subsequently, Table 7.5 reveals the VIF for each variable in the model.

According to the correlation results (Table 7.4), the highest correlation obtained is between the government ownership (GO) and pension fund ownership (PFO) ($r \sim 0.65$, $p < 0.05$). This indicates that firms with higher government ownership tend to have higher pension fund ownership. The second highest correlation obtained is between the free float ownership (FFO) and employee ownership (EO) ($r \sim -0.63$, $p < 0.05$). This indicates that firms with higher free float ownership tend to have lower employee ownership. This the same as the correlation between free float ownership (FFO) and foreign ownership (FOO), FFO and cross-holding ownership (CHO), and FFO and investment bank ownership (IBO), -49%, -41% and -23% respectively.

Nevertheless, as discussed in Section 4.4.2, the existence of multicollinearity can be confirmed if the correlation coefficient is higher than 80% between two independent variables. Consequently, the correlation test cannot reject the null hypothesis that multicollinearity is present.

However, this is not the case for the VIF test in Table 7.5 (called Initial Model). In particular, in the Initial Model (Table 7.5), all ownership identity variables are included, i.e. free float ownership, investment bank ownership, foreign ownership, government ownership, pension fund ownership, employee ownership, cross-holding ownership and other-holding ownership. However, the multicollinearity problem appears, especially among free float ownership (FFO), employee ownership (EO), cross-holding ownership (CHO) and investment bank ownership (IBO), all their VIF values are above ten. The best strategy to solve the problem is to examine free float ownership (FFO) alone with its effects on stock liquidity as shown in the Free Float Model (Table 7.6). After excluding FFO, the rest of the ownership identities, i.e. investment bank ownership, foreign ownership, government ownership, pension fund ownership, employee ownership, cross-holding ownership and other-holding ownership are included together in one model called the Ownership Identity Model (Table 7.7). After separating the Initial Model into the Free Float Model and Ownership Identity Model, we can conclude that all VIF values presented in Table 7.6 and Table 7.7 are below 10, which indicates that there are no multicollinearity problems within the models.

Table 7. 4 Correlation Matrix for the Relationship between Ownership Identity and Stock Liquidity

	QBAS	PIR	TR	TV	NT	FFO	IBO	FOO	GO	PFO	EO	CHO	OHO	SHP	RV	SIZE	AGE	LV
QBAS	1.0000																	
PIR	-0.2641*	1.0000																
TR	-0.1095*	-0.4773*	1.0000															
TV	-0.1018*	-0.7412*	0.6003*	1.0000														
NT	-0.6076*	-0.2941*	0.5800*	0.5726*	1.0000													
FFO	-0.1367*	-0.1668*	0.2849*	0.2515*	0.3118*	1.0000												
IBO	-0.1153*	0.1056*	-0.1383*	-0.1109*	-0.0737*	-0.2338*	1.0000											
FOO	-0.0160	-0.0363*	-0.1278*	0.0306	0.0025	-0.4922*	0.3242*	1.0000										
GO	0.0062	-0.0313	0.0314	0.0333*	0.0176	-0.0491*	-0.0276	-0.0136	1.0000									
PFO	0.0549*	-0.0432*	0.0527*	0.0533*	-0.0136	-0.1240*	-0.0043	0.0007	0.6504*	1.0000								
EO	0.1734*	0.1423*	-0.1722*	-0.2302*	-0.2839*	-0.6314*	-0.1693*	-0.0332*	-0.0447*	0.0126	1.0000							
CHO	0.0659*	-0.0210	-0.1010*	0.0053	-0.0441*	-0.4141*	-0.1489*	0.4827*	0.0320	0.0298	-0.2192*	1.0000						
OHO	-0.0456*	0.0502*	-0.0290	-0.0285	0.0253	-0.1303*	0.0081	0.1114*	-0.0056	0.0261	-0.0615*	-0.0359*	1.0000					
SHP	-0.5503*	0.7347*	-0.2351*	0.6740*	0.0889*	-0.0548*	0.1565*	0.0185	0.0322	0.0781*	-0.0225	0.0704*	-0.0762*	1.0000				
RV	-0.4009*	0.7279*	-0.1151*	-0.1933*	0.1160*	-0.0325	0.0292	-0.0146	-0.0029	-0.0055	0.0196	-0.0088	0.0374*	0.4313*	1.0000			
SIZE	-0.7600*	0.3275*	-0.1128*	0.0272	0.4568*	0.0349*	0.1464*	0.0895*	-0.0224	-0.0680*	-0.1230*	-0.0139	0.0906*	0.5650*	0.4136*	1.0000		
AGE	-0.0022	-0.0665*	-0.0294	0.0210	0.0472*	0.0425*	0.0262	-0.0722*	-0.0344*	-0.0444*	-0.0286	-0.0471*	0.0463*	-0.0584*	-0.0784*	-0.0309	1.0000	
LV	0.0182	0.1371*	-0.1320*	-0.1746*	-0.1646*	-0.1556*	0.0639*	-0.0267	0.0165	0.0061	0.1473*	-0.0120	0.0084	0.1008*	0.0002	0.0057	0.1458*	1.0000

Table 7. 5 VIF for the Initial Model

Initial Model Variance Inflation Factors (VIF)					
Variable	QBAS	PIR	TR	TV	NT
FFO	144.49	144.49	142.10	144.49	144.49
EO	113.21	113.21	111.66	113.21	113.21
CHO	68.52	68.52	66.63	68.52	68.52
IBO	34.98	34.98	34.43	34.98	34.98
OHO	6.59	6.59	6.58	6.59	6.59
GO	2.04	2.04	2.04	2.04	2.04
FOO	1.90	1.90	1.89	1.90	1.90
PFO	1.83	1.83	1.83	1.83	1.83
SHP	1.76	1.76	1.74	1.76	1.76
SIZE	1.67	1.67	1.66	1.67	1.67
RV	1.37	1.37	1.36	1.37	1.37
LV	1.08	1.08	1.09	1.08	1.08
AGE	1.04	1.04	1.04	1.04	1.04
Mean VIF	***29.27***	***29.27***	***28.77***	***29.27***	***29.27***

Table 7. 6 VIF for the Free Float Model

Free Float Model Variance Inflation Factors (VIF)					
Variable	QBAS	PIR	TR	TV	NT
SHP	1.69	1.69	1.68	1.69	1.69
SIZE	1.60	1.60	1.59	1.60	1.60
RV	1.35	1.35	1.35	1.35	1.35
LV	1.07	1.07	1.07	1.07	1.07
FFO	1.04	1.04	1.04	1.04	1.04
AGE	1.03	1.03	1.03	1.03	1.03
Mean VIF	***1.30***	***1.30***	***1.29***	***1.30***	***1.30***

Table 7. 7 VIF for the Ownership Identity Model

Ownership Identity Model Variance Inflation Factors (VIF)					
Variable	QBAS	PIR	TR	TV	NT
FOO	1.87	1.87	1.86	1.87	1.87
CHO	1.77	1.77	1.75	1.77	1.77
SHP	1.76	1.76	1.74	1.76	1.76
SIZE	1.67	1.67	1.66	1.67	1.67
PFO	1.58	1.58	1.58	1.58	1.58
GO	1.57	1.57	1.57	1.57	1.57
IBO	1.50	1.50	1.50	1.50	1.50
RV	1.36	1.36	1.36	1.36	1.36
EO	1.26	1.26	1.26	1.26	1.26
LV	1.08	1.08	1.09	1.08	1.08
OHO	1.07	1.07	1.07	1.07	1.07
AGE	1.04	1.04	1.04	1.04	1.04
Mean VIF	***1.46***	***1.46***	***1.46***	***1.46***	***1.46***

7.5 Findings on the Relationships of Free Floats and Ownership Identity with Liquidity

The current section will reveal the empirical findings on the relationship between free float ownership and stock liquidity, as well as ownership identity and stock liquidity. As thoroughly discussed in the methodology chapter (Section 4.4.1), the estimation method employed in this study is two-step system GMM with the aim of controlling for the endogeneity problems of unobservable heterogeneity, simultaneity and dynamic endogeneity.

This section examines the determination of the number of lags to be included in the models with different measures of stock liquidity as shown in Table 7.8. It is apparent that the number of lags of the different measures of stock liquidity obtained in Table 7.8 is the same as shown in previous Sections 5.5 and 6.5 (Tables 5.6 and 6.6 respectively). In more detail, the model with stock liquidity measured by the quoted bid-ask spread (QBAS) has three significant lags at the 1% level or below. This indicates that three lags should be included in the model to capture the momentum effects of the past stock liquidity. In contrast, all three lags in the model with stock liquidity measured by the price impact ratio (PIR) are statistically insignificant. Therefore, it is not necessary to include lagged stock liquidity. In models of stock liquidity measured by turnover ratio (TR), trading volume (TV) and number of trades (NT), only the significant first lagged variable is included.

The analysis findings for the ***eight hypotheses*** (Section 7.2) will be revealed in the subsequent section. However, as discussed in Section 7.4, this chapter will have two different models: (1) the effects of free float ownership on stock liquidity and (2) the effects of other ownership identities, i.e. investment bank ownership, foreign ownership, government ownership, pension fund ownership, employee ownership, cross-holding ownership and other-holding ownership on stock liquidity.

Table 7. 8 Number of Lags for Stock Liquidity Variables

The table below indicates the pooled OLS regression for Equation 4.3. To quickly recap, the equation is:

$$LIQUI_{it} = \alpha_1 + \sum_{g=1}^{g=3} \kappa_g LIQUI_{it-g} + \kappa C_{it} + \eta_i + \varepsilon_{it}$$

Where $LIQUI_{it}$ represents current stock liquidity variables, $LIQUI_{it-1}$, $LIQUI_{it-2}$ and $LIQUI_{it-3}$ represent the three lags of past stock liquidity variables, $Control_{it}$ represents the control variables (i.e. share price (SHR), return volatility (RV), firm size (SIZE), leverage (LV) and firm age (AGE)). Year dummies and industry dummies are included in all regressions. Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean variables have significance at 1%, 5% and 10% levels respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	QBAS	PIR	TR	TV	NT
Liquidity t-1	4.510***	0.000	32.74***	0.000***	0.001*
	(11.88)	(0.28)	(4.15)	(4.05)	(1.92)
Liquidity t-2	-0.701**	-0.000	-3.728	0.000	-0.000
	(-2.53)	(-0.31)	(-0.38)	(0.15)	(-0.40)
Liquidity t-3	0.550***	0.000	0.746	-0.000	0.001***
	(3.11)	(1.34)	(0.42)	(-0.10)	(3.94)
SHP	-0.063***	-1.206***	0.059***	0.929***	0.098***
	(-8.73)	(-37.17)	(5.69)	(42.39)	(5.51)
RV	0.000	0.001***	-0.000**	-0.000***	-0.000***
	(0.21)	(17.10)	(-2.25)	(-3.22)	(-3.48)
SIZE	-0.257***	-0.200***	-0.016	0.672***	0.409***
	(-21.54)	(-4.56)	(-1.30)	(22.18)	(15.76)
LV	-0.011	0.014	-0.001	0.006	-0.005
	(-1.56)	(0.46)	(-0.16)	(0.32)	(-0.36)
AGE	-0.036	0.039	-0.049	-0.162***	0.004
	(-1.46)	(0.35)	(-1.54)	(-3.05)	(0.08)
Constant	-2.303***	-5.723***	-5.595***	6.448***	1.697***
	(-16.4)	(-13.61)	(-43.03)	(19.16)	(5.59)
Observations	2,010	2,005	1,942	2,005	2,005
R-squared	0.730	0.733	0.249	0.773	0.444
Year/Industry effect	*YES/YES*	*YES/YES*	*YES/YES*	*YES/YES*	*YES/YES*

7.5.1 Effects of Free Float Ownership and Ownership Identity on Stock Liquidity

This section aims to provide the empirical findings for the third research question of this thesis, i.e. "does ownership identity influence stock liquidity on the AIM?" Two models are employed in this chapter: (1) the effects of free float ownership on stock liquidity, and (2) the effects of ownership identity on stock liquidity. Below are the two estimations of the system GMM tested in this study:

$$LIQUI_{it} = \alpha + \kappa_g \sum LIQUI_{it-g} + \beta FFO_{it} + \gamma C_{it} + \theta X_{it} + \mu i + \varepsilon_{it} \quad (7.1)$$

$$LIQUI_{it} = \alpha + \kappa_g \sum LIQUI_{it-g} + \beta Identity_{it} + \gamma C_{it} + \theta X_{it} + \mu i + \varepsilon_{it} \quad (7.2)$$

Where $LIQUI_{it}$ represents the five measures of stock liquidity (quoted bid-ask spread (QBAS), price impact ratio (PIR), turnover ratio (TR), trading volume (TV) and number of trades (NT)), respectively. Note that the numbers of lags included are based on the results obtained in the preliminary result (Table 6.6) for each stock liquidity measure. In particular, there are three lags for the quoted bid-ask spread (QBAS), one lag for turnover ratio (TR), trading volume (TV) and number of trades (NT), and no lag is included for the price impact ratio (PIR). FFO_{it} represents free float ownership in Equation 7.1. $Identity_{it}$ represents the ownership identity variables, i.e. investment bank ownership, foreign ownership, government ownership, pension fund ownership, employee ownership, cross-holding ownership and other-holding ownership in Equation 7.2. $Control_{it}$ represents the control variables, i.e. share price (SHR), return volatility (RV), firm size (SIZE), leverage (LV) and firm age (AGE). X_{it} represents the exogenous variables (i.e. firm age and year dummies). μi represents the unobserved fixed effects and ε_{it} represents the error terms.

Table 7.8 and Table 7.9 present results for five models stated in Equation 7.1 and Equation 7.2, respectively, with five measures of stock liquidity as dependent variables mentioned above. Also, robust standard errors being employed to control for heteroscedasticity and serial correlation.

Starting with Table 7.8, which investigates the relationship between free float ownership (FFO) and stock liquidity, this ownership identity is found to be significantly and negatively associated with informational friction variables (QBAS and PIR, Columns 1 and 2 respectively) at 1% and 5% significance levels respectively. However, FFO and real friction variables

(Columns 3, 4 and 5) have significant positive relationships with TR, TV and NT at 5%, 1% and 1% significance levels respectively. These findings imply that free float ownership positively and significantly influences stock liquidity in the AIM. The positive relationships have been reported by prior studies in the literature, such as (Park, 2009, Ginglinger and Hamon, 2012, Ding et al., 2016). The positive relationships are in line with the argument that free float ownership can enhance stock liquidity by increasing the firm's trading activities and reducing asymmetric information (Ding et al., 2016). Thus, ***hypothesis 1***, which states that free float ownership is positively related to stock liquidity, is accepted for FTSE AIM All-Share firms.

Regarding the controlling variables of this study (share price, return volatility, firm size, financial leverage and firm age), these variables are found to have the same influence on stock liquidity as obtained/discussed in the previous empirical chapter (Section 6.5.1, Table 6.7). In other words, share price and firm size have significant positive relationships with stock liquidity. In contrast, return volatility and firm age have significant negative relationships with stock liquidity. As discussed in Section 5.5.1 and Section 6.5.1, these findings are in line with prior studies in the literature, such as (Stoll, 2000). Financial leverage, however, is found to have no significant relationship with any stock liquidity variables.

Regarding Table 7.9, which examines the effects of ownership identity on stock liquidity, investment bank ownership (IBO) has no significant relationship with QBAS, but a significant positive relationship with PIR at 1% significance level ($\alpha_{IBO} = 0.033$). This is to say the higher the investment bank ownership, the higher the price impact ratio, i.e. there is decreased stock liquidity. For the real friction variables (Columns 3, 4 and 5), IO has a negative and significant relationship with TR, TV and NT at 1% significance level ($\alpha_{IBO} = -0.015$, -0.031 and -0.048, respectively). In other words, the higher the investment bank ownership, the lower the trading activity, i.e. there is decreased stock liquidity.

Overall, based on different measures of stock liquidity, investment bank ownership is negatively associated with stock liquidity on the AIM. This relationship has been supported by previous studies on the topic (Park, 2009, Liu, 2013). The finding is in line with the argument that bank owners have more ability than other identities to monitor managers, since banks are able to carry the costs of becoming knowledgeable about their client companies (Hoshi et al., 1991). The monitoring role of those banks can in turn allow them access to private information about the firms, which can increase asymmetric information. Thus, ***hypothesis 2a***, which states

that investment bank ownership is positively related to stock liquidity, is rejected for FTSE AIM All-Share firms, whilst ***hypothesis 2b***, which states that investment bank ownership is negatively related to stock liquidity, is accepted for FTSE AIM All-Share firms.

In addition, foreign ownership (FOO) has no significant relationship with QBAS, but a significant negative relationship with PIR at 1% significance level. FOO also has no significant relationship with TR, but a significant positive relationship with TV and NT at 10% and 1% significance levels respectively. These results suggest that FOO positively and significantly influences stock liquidity on the AIM. The positive relationship has been supported by previous studies on the topic (Dahlquist and Robertsson, 2001, Næs, 2004, Ding et al., 2017, Lee and Chung, 2018). The positive relationship is in line with the argument that foreign ownership brings benefits to domestic stock markets by lowering trading costs through rising competition in the process of price search. This may increase trading activity of firms and enhance stock liquidity (Ding et al., 2017, Lee and Chung, 2018). Thus, ***hypothesis 3a***, which states that foreign ownership is positively related to stock liquidity, is accepted for FTSE AIM All-Share firms, whilst ***hypothesis 3b***, which states that foreign ownership is negatively related to stock liquidity, is rejected for FTSE AIM All-Share firms.

Government ownership (GO) significantly and negatively affects stock liquidity on the AIM, since it is positively related to QBAS ($\alpha_{GO} = 0.008$, $p < 0.1$), whilst being negatively associated with TR and NT, at 5% and 1% significance levels ($\alpha_{GO} = -0.012$ and -0.020) respectively. This relationship has been supported by previous studies on the topic (Næs, 2004, Park, 2009, Tran et al., 2018). The negative relationship is in line with the argument that government ownership contributes to increasing the agency problem and information asymmetry (Shleifer and Vishny, 1997, Chu et al., 2015), as well as being considered inactive trading, which leads to a reduction in stock liquidity (Tran et al., 2018). Thus, ***hypothesis 4***, which states that government ownership is negatively related to stock liquidity, is accepted for FTSE AIM All-Share firms.

Pension fund ownership (PFO) has a significant negative relationship with both QBAS and PIR at 5% and 1% significance levels respectively, whereas PFO is significantly and positively associated with TR, TV and NT at 1% significance level. These results suggest that pension fund ownership positively and significantly influences stock liquidity on the AIM. The positive relationship has been reported by some prior studies in the literature (Poon et al., 2013, Ajina et al., 2015). The positive relationship is in line with the argument that pension fund ownership is relatively free from corporate pressure and conflicts of interest compared to other

institutional ownership (Guercio and Hawkins, 1999). Pension funds manage a great amount of firm assets, which can contribute to the reduction of transaction costs, thus enhancing stock liquidity (Ajina et al., 2015). Thus, ***hypothesis 5a***, which states that pension fund ownership positively related to stock liquidity, is accepted for FTSE AIM All-Share firms, whilst ***hypothesis 5b***, which states that pension fund ownership is negatively related to stock liquidity, is rejected for FTSE AIM All-Share firms.

Furthermore, this study finds that employee ownership (EO) has a significant positive relationship with QBAS and PIR (α_{EO} = 0.005 and 0.014; $p < 0.05$), whilst it is found to be significantly and negatively associated with TR, TV and NT (α_{EO} = -0.009, -0.025 and -0.029; $p < 0.01$). The results imply that EO negatively affects stock liquidity on the AIM. The negative relationship has been reported by prior studies in the literature (Park, 2009, Brockman et al., 2009). The negative relationship is in line with the argument that employee ownership is associated with employee benefit plans, which tie employee payoffs to the firm's performance. This action can provide incentive contracts that contribute to align the interests of employees with managers, as well as to provide greater monitoring and participation in decision making (O'Boyle et al., 2016). Another explanation for the negative relationship may be because employees are unlikely to turnaround their companies' shares frequently; it stands to reason that high employee equity participation reduces liquidity. Thus, ***hypothesis 6***, which states that employee ownership negatively related to stock liquidity, is accepted for FTSE AIM All-Share firms.

Cross-holding ownership (CHO) significantly and negatively affects stock liquidity on the AIM, since it is significantly and positively related to PIR at 1% significance level and significantly and negatively related to TR, TV and NT at 1% significance level. The negative relationship has been reported by prior studies in the literature (Park, 2009). This relationship is in line with the argument that cross-holding ownership may increase the potential of mergers and acquisitions, as well as changing decision-making processes and corporate strategies due to their information advantages (Brooks, Chen, & Zeng, 2018). Thus, ***hypothesis 7***, which states that cross-holding ownership negatively related to stock liquidity, is accepted for FTSE AIM All-Share firms.

Finally, other-holding ownership (OHO) is found to be significantly and positively associated with QBAS and PIR at 1% significance level and significantly and negatively associated with TR, TV and NT at 1% significance level. These results imply that OHO has a significant

negative relationship with stock liquidity on the AIM. Thus, only ***hypothesis 8b***, which states that other-holding ownership is negatively related to stock liquidity, is accepted for FTSE AIM All-Share firms.

The findings of the controlling variables reported in Table 7.9 are the same as Table 7.8. In particular, share price and firm size have significant positive relationships with stock liquidity. In contrast, return volatility and firm age have significant negative relationships with stock liquidity. Financial leverage, however, is found to have no significant relationship with any stock liquidity variables.

Regarding the results for the four specification tests related to the system GMM for both Table 7.8 and Table 7.9 (i.e. the first serial correlation (AR(1)), second serial correlation (AR(2)), Hansen test and differences in Hansen test), the null hypothesis that no serial correlation is accepted. This is because AR(1) is statistically significant at 1% significance level whilst AR(2) shows insignificant results for all models. In addition, the Hansen tests and differences in Hansen test for all models are not significant. Therefore, it can be concluded that the employed instrumental variables are valid and are exogenous.

Table 7. 9 Effects of Free Float Ownership on Stock Liquidity

The table below reports the results of the system GMM using quoted bid–ask spread (QBAS) and price impact ratio (PIR) as proxies for informational friction and turnover ratio (TR), and trading volume (TV) and number of trades (NT) as proxies for real friction. The independent variable is free float ownership (FFO). The control variables are share price (SHP), return volatility (RV), firm size (SIZE), financial leverage (LV) and firm age (AGE). Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively. P-values of AR (1) are test for first order serial correlation and AR (2) are for second order serial correlation, under the null hypothesis of no serial correlation. P-values of the Hansen test of over-identification are under the null hypothesis that all instrumental variables are valid. P-values of the difference in Hansen test of exogeneity are under the null hypothesis that instrumental variables employed in levels are exogenous.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	QBAS	PIR	TR	TV	NT
FFO	-0.004***	-0.011**	0.007**	0.022***	0.018***
	(-2.65)	(-2.11)	(2.22)	(6.57)	(5.11)
SHP	-0.076***	-0.931***	0.178***	1.096***	0.293***
	(-3.47)	(-10.11)	(2.70)	(14.85)	(5.68)
RV	-0.011	1.053***	-0.026	0.002	-0.033
	(-0.50)	(17.24)	(-0.84)	(0.06)	(-0.90)
SIZE	-0.287***	-0.776***	0.167	0.801***	0.610***
	(-7.87)	(-4.73)	(1.58)	(6.86)	(5.52)
LV	-0.011	0.085	0.058	-0.097	0.021
	(-0.63)	(1.32)	(1.45)	(-1.17)	(0.38)
AGE	-0.004	0.349***	-0.180*	-0.126	-0.094
	(-0.09)	(2.87)	(-1.80)	(-1.29)	(-0.93)
LIQUI-1	3.502***	-	22.94**	0.000*	0.001***
	(4.15)		(2.09)	(1.90)	(3.40)
LIQUI-2	-1.102*	-	-	-	-
	(-1.93)				
LIQUI-3	0.943**	-	-	-	-
	(2.06)				
Constant	-1.711***	-3.791***	-5.842***	4.746***	0.433
	(-7.30)	(-7.46)	(-17.19)	(11.27)	(1.18)
Observations	1,997	1,994	1,932	1,994	1,994
AR (1) test	0.000	0.000	0.001	0.000	0.000
AR (2) test	0.358	0.120	0.148	0.113	0.148
Hansen test of over-identification	0.191	0.143	0.124	0.117	0.194
Diff in Hansen tests of exogeneity	0.279	0.326	0.304	0.392	0.331

Table 7. 10 Effects of Ownership Identity on Stock Liquidity

The table below reports the results of the system GMM using quoted bid–ask spread (QBAS) and price impact ratio (PIR) as proxies for informational friction and turnover ratio (TR), and trading volume (TV) and number of trades (NT) as proxies for real friction. The independent variables are investment bank ownership (IBO), foreign ownership (FOO), government ownership (GO), pension fund ownership (PFO), employee ownership (EO), cross-holding ownership (CHO) and other-holding ownership (OHO). The control variables are share price (SHP), return volatility (RV), firm size (SIZE), financial leverage (LV) and firm age (AGE). Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively. P-values of AR (1) are test for first order serial correlation and AR (2) are for second order serial correlation, under the null hypothesis of no serial correlation. P-values of the Hansen test of over-identification are under the null hypothesis that all instrumental variables are valid. P-values of the difference in Hansen test of exogeneity are under the null hypothesis that instrumental variables employed in levels are exogenous.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	QBAS	PIR	TR	TV	NT
IBO	0.005	0.033***	-0.015***	-0.031***	-0.048***
	(1.45)	(3.05)	(-2.98)	(-4.74)	(-6.60)
FOO	0.000	-0.019***	0.002	0.008*	0.015***
	(0.24)	(-2.60)	(0.72)	(1.65)	(2.88)
GO	0.008*	-0.007	-0.012**	-0.015	-0.020***
	(1.80)	(-0.57)	(-2.06)	(-1.34)	(-2.80)
PFO	-0.008**	-0.024***	0.016***	0.027***	0.030***
	(-2.08)	(-2.62)	(3.77)	(3.14)	(4.13)
EO	0.005**	0.014**	-0.009***	-0.025***	-0.029***
	(2.31)	(2.49)	(-2.87)	(-6.91)	(-8.01)
CHO	0.004	0.030***	-0.013***	-0.025***	-0.030***
	(1.53)	(3.38)	(-2.93)	(-4.08)	(-4.89)
OHO	0.012***	0.033***	-0.015***	-0.026***	-0.029***
	(2.89)	(2.60)	(-2.75)	(-2.77)	(-3.24)
SHP	-0.109***	-0.934***	0.093**	1.021***	0.099***
	(-5.53)	(-13.24)	(2.52)	(18.47)	(3.74)
RV	-0.004	0.976***	-0.057**	-0.031	-0.124***
	(-0.33)	(16.18)	(-2.45)	(-1.02)	(-4.30)
SIZE	-0.278***	-0.682***	0.055	0.792***	0.447***
	(-7.29)	(-5.07)	(1.27)	(8.32)	(6.62)
LV	-0.025	0.048	0.077	0.026	-0.052
	(-1.32)	(0.93)	(1.52)	(0.68)	(-1.30)
AGE	0.012	0.246**	-0.131**	-0.295**	-0.009
	(0.21)	(2.01)	(-2.02)	(-1.98)	(-0.10)
LIQUI-1	3.942***	-	31.85	0.000	0.001***
	(5.93)		(1.64)	(1.44)	(3.68)
LIQUI-2	-0.952**	-	-	-	-
	(-2.21)				
LIQUI-3	0.680*	-	-	-	-
	(1.77)				
Constant	-2.228***	-4.962***	-5.267***	7.433***	1.944***
	(-11.88)	(-9.84)	(-15.58)	(15.44)	(6.05)
Observations	1,994	1,991	1,934	1,991	1,991
AR (1) test	0.000	0.000	0.010	0.000	0.000
AR (2) test	0.484	0.123	0.104	0.117	0.161
Hansen test of over-identification	0.458	0.476	0.318	0.318	0.178
Diff in Hansen tests of exogeneity	0.400	0.727	0.718	0.318	0.240

Overall, the system GMM estimator has indicated that firms listed on the AIM with higher free float ownership, foreign ownership and pension fund ownership tend to exhibit higher stock liquidity. In contrast, firms with higher investment bank ownership, government ownership, employee ownership, cross-holding ownership and other-holding ownership tend to exhibit lower stock liquidity. These findings are consistent across different measures of stock liquidity. In the following section, this study will provide a number of robustness checks, i.e. the use of alternative measures of stock liquidity, controlling for trading activity and adding more control variables, to confirm the findings obtained in this section.

7.6 Robustness Check

After conducting the main analysis using the system GMM, three additional tests will be carried out as robustness checks to confirm the findings obtained in Section 7.5.1. The first test re-examines the two main investigated models: effects of free float ownership and ownership identity on two additional measures of stock liquidity. These two measures are quoted depth and market quality index. In the second test, the relationship between free float ownership, ownership identity and informational friction variables, i.e. QBAS and PIR, is re-examined by controlling for trading activity, i.e. trade size. In the third test, the two models are tested by adding additional control variables: research and development expenses and dividend payout ratio.

7.6.1 Quoted Depth and Market Quality Index

As discussed in Section 5.6.1, both market quality index (MQI) and quoted depth (QDP) are employed as proxies of stock liquidity. Table 7.10 shows the results for the relationships between free float ownership and MQI and QDP (Panel A) and between ownership identity and MQI and QDP (Panel B). In general, the results are consistent with those obtained in the two main analyses (Table 7.8 and Table 7.9), such that higher free float ownership, foreign ownership and pension fund ownership can improve stock liquidity, whereas higher investment bank ownership, government ownership, employee ownership, cross-holding ownership and other-holding ownership tend to reduce stock liquidity.

In detail, Panel A indicates that free float ownership (FFO) has a significant positive relationship with both MQI and QDP (α_{FFO} = 0.032 and 0.025, $p < 0.01$). Panel B shows that

investment bank ownership (IBO) has a significant negative relationship with both MQI and QDP (α_{IBO} = -0.035 and -0.042, $p < 0.01$). Besides this, foreign ownership (FOO) has a significant positive relationship with QDP at 5% significance level, whereas government ownership (GO) has a significant negative relationship with MQI at 10% significance level. Panel B also indicates that pension fund ownership (PFO) has a significant positive relationship with MQI and QDP (α_{PFO} = 0.033 and 0.021; $p < 0.01$, respectively). In contrast, both employee ownership (EO) and cross-holding ownership (CHO) have a significant negative relationship with both MQI and QDP at 1% significance level. Other-holding ownership (OHO) has a significant negative relationship with MQI at 5% significance level.

Given the above, after examining the relationships between free float ownership (Panel A) and ownership identity (Panel B) and stock liquidity using two additional proxies of stock liquidity – MQI and QDP – the results remain unchanged. This adds to the robustness and validity of the main findings.

Table 7. 11 Effects of Free Floats and Ownership Identity on MQI and QDP

The table below reports the results of the system GMM for the relationship between free float ownership (Panel A) and ownership identity (Panel B) and both market quality index (MQI) and quoted depth (QDP). The definitions of variables, as well as the four system GMM tests – AR (1), AR (2), Hansen test of over-identification and difference in Hansen test of exogeneity – are as in Table 7.8 and Table 7.9. Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

	PANEL (A)		**PANEL (B)**	
	(1)	(2)	(1)	(2)
VARIABLES	MQI	QDP	MQI	QDP
FFO	0.032***	0.025***		
	(6.68)	(6.70)		
IBO			-0.035***	-0.042***
			(-3.29)	(-4.81)
FOO			0.011	0.017**
			(1.08)	(2.09)
GO			-0.028*	-0.009
			(-1.86)	(-0.53)
PFO			0.033***	0.021***
			(3.85)	(2.58)
EO			-0.041***	-0.027***
			(-7.18)	(-6.47)
CHO			-0.039***	-0.035***
			(-3.80)	(-4.79)
OHO			-0.035**	-0.007
			(-2.47)	(-0.52)
SHP	0.021	0.068	0.110*	-0.037
	(0.28)	(1.18)	(1.66)	(-0.80)
RV	-0.040	-0.065**	0.004	-0.059*
	(-0.94)	(-2.15)	(0.11)	(-1.95)
SIZE	1.088***	0.791***	0.959***	0.811***
	(8.26)	(8.51)	(7.23)	(10.96)
LV	0.008	0.012	0.002	0.002
	(0.16)	(0.32)	(0.30)	(0.53)
AGE	-0.179	-0.235***	-0.408**	-0.403**
	(-1.49)	(-2.72)	(-2.04)	(-2.31)
LIQUI-1	0.000***	0.000***	0.000***	0.000***
	(4.42)	(6.57)	(3.98)	(6.06)
LIQUI-2	-	-	-	-
LIQUI-3	-	-	-	-
Constant	6.116***	5.056***	9.989***	7.722***
	(13.69)	(15.93)	(17.35)	(17.04)
Observations	1,997	1,994	1,994	1,991
AR (1) test	0.000	0.000	0.000	0.000
AR (2) test	0.139	0.108	0.160	0.122
Hansen test of over-identification	0.209	0.123	0.334	0.489
Diff in Hansen tests of exogeneity	0.471	0.134	0.334	0.562

7.6.2 Informational Friction Variables and Trading Activity

As discussed in Section 6.6.2, this study controls for trading activity (trade size) whilst examining the relationship between ownership identities and the informational friction variables of quoted bid-ask spread (QBAS) and price impact ratio (PIR). Table 7.11 shows the results for the effects of free float ownership (Panel A) and ownership identity (Panel B) on the informational friction variables (QBAS and PIR) whilst controlling for trade size (TS).

In general, the results are consistent with those obtained in the two main analyses (Table 7.8 and Table 7.9), such that higher free float ownership, foreign ownership and pension fund ownership can improve stock liquidity, whereas higher investment bank ownership, government ownership, employee ownership, cross-holding ownership and other-holding ownership tend to reduce stock liquidity. In detail, Panel A shows that free float ownership (FFO) has a significant negative relationship with QBAS and PIR at 10% and 5% significance levels respectively. According to Panel B, investment bank ownership (IBO) has a significant positive relationship with PIR at 1% significance level. Foreign ownership (FOO) has a significant negative relationship with PIR at 10% significance level. Government ownership (GO) has a significant positive relationship with QBAS at 10% significance level. Pension funds are negatively and significantly associated with both QBAS and PIR at 1% and 5% significance levels respectively. Employee ownership (EO) has a significant positive relationship with QBAS and PIR at 1% significance level. Cross-holding ownership is positively and significantly related to both QBAS and PIR at 10% and 1% significance levels respectively. Other-holding ownership is also positively and significantly related to both QBAS and PIR at 1% and 5% significance levels respectively.

Given the above, after examining the relationship between free float ownership (Panel A), ownership identity (Panel B) and informational friction variables (QBAS and PIR) using an additional control variable – trade size – the results remain unchanged. This adds to the robustness and validity of the main findings.

Table 7. 12 Effects of Free Floats and Ownership Identity on Informational Friction

The table below reports the results of the system GMM for the relationship between free float ownership (Panel A), ownership identity (Panel B) and the informational friction variables of quoted bid-ask spread (QBAS) and price impact ratio (PIR) whilst controlling for the trading activity (trade size (TS)). The definitions of variables, as well as the four system GMM tests – AR (1), AR (2), Hansen test of over-identification and difference in Hansen test of exogeneity – are as in Table 7.8 and Table 7.9. Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

	PANEL (A)		**PANEL (B)**	
	(1)	(2)	(1)	(2)
VARIABLES	QBAS	PIR	QBAS	PIR
FFO	-0.003*	-0.012**		
	(-1.93)	(-2.25)		
IBO			0.004	0.034***
			(1.00)	(3.17)
FOO			-0.002	-0.016*
			(-0.65)	(-1.95)
GO			0.011*	-0.005
			(1.87)	(-0.31)
PFO			-0.010***	-0.022**
			(-2.69)	(-2.01)
EO			0.006***	0.020***
			(2.64)	(2.98)
CHO			0.005*	0.030***
			(1.66)	(3.00)
OHO			0.014***	0.026**
			(2.74)	(1.97)
SHP	-0.083***	-1.068***	-0.140***	-1.055***
	(-3.04)	(-4.12)	(-4.30)	(-5.24)
RV	-0.010	1.051***	-0.001	0.912***
	(-0.87)	(17.33)	(-0.09)	(12.75)
SIZE	-0.303***	-0.799***	-0.261***	-0.630***
	(-7.57)	(-4.18)	(-7.14)	(-3.67)
LV	-0.011	0.082	-0.034	0.059
	(-0.66)	(1.25)	(-1.52)	(1.08)
AGE	0.001	0.352***	-0.009	0.243*
	(0.05)	(2.73)	(-0.19)	(1.90)
TS	-0.000	0.165	-0.000	0.076
	(-1.17)	(0.58)	(-0.61)	(0.35)
LIQUI-1	2.713***	-	4.218***	-
	(3.39)		(5.79)	
LIQUI-2	-0.936*	-	-1.463***	-
	(-1.69)		(-3.07)	
LIQUI-3	0.970**	-	0.852**	-
	(2.14)		(2.19)	
Constant	-1.652***	-4.544***	-2.088***	-5.716***
	(-7.08)	(-3.53)	(-9.91)	(-4.68)
Observations	1,997	1,994	1,994	1,991
AR (1) test	0.000	0.000	0.000	0.000
AR (2) test	0.437	0.119	0.232	0.120
Hansen test of over-identification	0.102	0.175	0.327	0.544
Diff in Hansen tests of exogeneity	0.236	0.320	0.810	0.346

7.6.3 Additional Control Variables

As discussed in Section 6.6.3, this study controls for research and development expenditures (R&D) and dividend payout ratio (DPR) as additional variables. Table 7.12 shows the results of the relationship between free float ownership and stock liquidity, whereas Table 7.13 indicates the results of the relationship between ownership identity and stock liquidity with controls for the additional control variables R&D and DPR.

In general, the results are consistent with the findings of the two main analyses (Table 7.8 and Table 7.9), such that firms listed on the AIM with higher free float ownership, foreign ownership and pension fund ownership tend to exhibit higher stock liquidity. In contrast, firms with higher investment bank ownership, government ownership, employee ownership, cross-holding ownership and other-holding ownership tend to exhibit lower stock liquidity.

In detail, Table 7.12 indicates that free float ownership (FFO) has a significant negative relationship with both QBAS and PIR at 1% significance level and a significant positive relationship with TR, TV and NT at 1% significance level. Regarding Table 7.13, investment bank ownership (IBO) is found to be significantly and positively related to PIR at 5% significance level (α_{IBO} = 0.023) and significantly and negatively related to RT, TV and NT at 1% significance level (α_{IBO} = -0.014, -0.023 and -0.034). Foreign ownership (FOO) has a significant negative relationship with PIR at 5% significance level and a significant positive relationship with NT at 10% significance level. Government ownership (GO) has a significant positive relationship with QBAS at 10% significance level and a significant negative relationship with TR and NT at 5% and 1% significance levels respectively.

Besides this, pension fund ownership found (PFO) is found to be significantly negatively associated with QBAS and PIR (α_{PFO} -0.010 and -0.028; $p < 0.05$ and 0.01, respectively) and significantly positively related to TR, TV and NT (α_{PFO} = 0.016, 0.029 and 0.030; $p < 0.01$, respectively). Also, both employee ownership (EO) and other-holding ownership (OHO) have significant positive relationships with QBAS and PIR at 1% significance level and significant negative relationships with TR, TV and NT at 1% significance levels. Cross-holding ownership (CHO) is found to be significantly positively associated with QBAS and PIR at 10% and 1% significance levels respectively and significantly negatively associated with TR, TV and NT at 1% significance level.

Finally, according to Table 7.12 and Table 7.13, both R&D and DPR have a negative and significant relationship with stock liquidity in the AIM. For instance, R&D has a significant positive relationship with QBAS at 1% significance level and a significant negative relationship with TR, TV and NT at 10%, 5% and 1% significance levels respectively (Table 7.12). DPR has a significant positive relationship with PIR at 1% significance level and a significant negative relationship with TV and NT at 1% significance level (Table 7.13).

Given the above, after examining the relationship between free float ownership, ownership identity and stock liquidity using two additional control variables – R&D and DPR – the results remain unchanged. This adds to the robustness and validity of the main findings.

Table 7. 13 Free Float Ownership and Liquidity: Additional Variables R&D & DPR

The table below reports the results of the system GMM for the relationship between free float ownership (FFO) and stock liquidity whilst adding more controlling variables: research and development expenditures (R&D) and dividend payout ratio (DPR). Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	QBAS	PIR	TR	TV	NT
FFO	-0.005***	-0.014***	0.009***	0.023***	0.020***
	(-3.36)	(-2.99)	(4.73)	(8.44)	(6.17)
SHP	-0.103***	-0.864***	0.152***	1.004***	0.227***
	(-4.84)	(-10.15)	(3.97)	(15.06)	(4.27)
RV	-0.000	0.920***	0.000	0.023	0.005
	(-0.01)	(15.67)	(0.03)	(0.57)	(0.18)
SIZE	-0.293***	-0.743***	0.135**	0.827***	0.619***
	(-8.16)	(-5.90)	(2.14)	(8.38)	(7.94)
LV	-0.019	0.014	0.007	0.055	0.048
	(-1.06)	(0.28)	(1.15)	(0.66)	(1.19)
AGE	-0.008	0.219*	-0.028	-0.126	-0.041
	(-0.22)	(1.92)	(-0.26)	(-1.32)	(-0.35)
R&D	0.016***	0.028	-0.016*	-0.024**	-0.042***
	(2.89)	(1.48)	(-1.79)	(-2.18)	(-3.18)
DPR	0.002	0.095***	-0.009	-0.051***	-0.040***
	(0.37)	(5.10)	(-0.71)	(-3.27)	(-3.05)
LIQUI-1	4.126***	-	19.97**	0.000*	0.001***
	(5.05)		(1.96)	(1.85)	(3.03)
LIQUI-2	-1.311**	-	-	-	-
	(-2.36)				
LIQUI-3	0.775*	-	-	-	-
	(1.71)				
Constant	-1.396***	-1.814***	-6.615***	3.753***	-0.854
	(-5.00)	(-2.71)	(-15.57)	(6.98)	(-1.55)
Observations	1,997	1,994	1,901	1,994	1,994
AR (1) test	0.000	0.000	0.000	0.000	0.000
AR (2) test	0.391	0.102	0.147	0.105	0.113
Hansen test of over-identification	0.118	0.204	0.135	0.216	0.380
Diff in Hansen tests of exogeneity	0.544	0.414	0.423	0.141	0.131

Table 7. 14 Ownership Identity and Liquidity: Additional Variables R&D & DPR

The table below reports the results of the system GMM for the relationship between ownership identity and stock liquidity whilst adding more controlling variables: research and development expenditures (R&D) and dividend payout ratio (DPR). Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	QBAS	PIR	TR	TV	NT
IBO	0.003	0.023**	-0.014***	-0.023***	-0.034***
	(1.14)	(2.44)	(-2.72)	(-3.72)	(-5.17)
FOO	0.001	-0.014**	0.002	0.004	0.010*
	(0.66)	(-2.21)	(0.60)	(0.86)	(1.87)
GO	0.008*	0.001	-0.012**	-0.017	-0.018***
	(1.74)	(0.09)	(-2.04)	(-1.63)	(-3.87)
PFO	-0.010**	-0.028***	0.016***	0.029***	0.030***
	(-2.51)	(-3.54)	(3.76)	(3.95)	(5.31)
EO	0.006***	0.015***	-0.009***	-0.023***	-0.026***
	(3.42)	(2.91)	(-2.70)	(-7.37)	(-8.55)
CHO	0.004*	0.031***	-0.013***	-0.026***	-0.028***
	(1.65)	(3.78)	(-2.91)	(-4.84)	(-4.95)
OHO	0.011***	0.035***	-0.015***	-0.025***	-0.026***
	(2.94)	(2.94)	(-2.67)	(-2.95)	(-2.87)
SHP	-0.110***	-0.886***	0.090**	0.957***	0.097***
	(-5.10)	(-12.07)	(2.54)	(12.63)	(4.33)
RV	-0.014	0.887***	-0.056***	-0.008	-0.069**
	(-0.76)	(17.16)	(-2.62)	(-0.22)	(-2.36)
SIZE	-0.272***	-0.665***	0.056	0.786***	0.504***
	(-7.64)	(-5.91)	(1.29)	(8.85)	(10.01)
LV	-0.032	-0.006	0.085	0.048	-0.009
	(-1.63)	(-0.13)	(1.58)	(1.31)	(-0.24)
AGE	0.008	0.135	-0.146**	-0.181	0.072
	(0.20)	(1.17)	(-2.07)	(-1.23)	(0.80)
R&D	0.011*	0.016	0.000	-0.023**	-0.032***
	(1.78)	(1.11)	(0.18)	(-1.97)	(-2.95)
DPR	0.004	0.076***	-0.001	-0.036***	-0.044***
	(0.69)	(4.96)	(-0.55)	(-2.81)	(-4.95)
LIQUI-1	3.873***	-	30.89	0.000	0.001***
	(6.10)		(1.60)	(1.56)	(2.88)
LIQUI-2	-1.132**	-	-	-	-
	(-2.56)				
LIQUI-3	0.758**	-	-	-	-
	(2.05)				
Constant	-2.094***	-3.631***	-5.215***	6.395***	0.713**
	(-8.61)	(-6.27)	(-16.52)	(10.82)	(2.11)
Observations	1,994	1,991	1,934	1,991	1,991
AR (1) test	0.000	0.000	0.009	0.000	0.000
AR (2) test	0.468	0.104	0.198	0.107	0.118
Hansen test of over-identification	0.368	0.216	0.248	0.522	0.516
Diff in Hansen tests of exogeneity	0.142	0.637	0.562	0.114	0.784

7.7 Summary

In the third empirical research of this thesis, the main objective was to examine the association of ownership identity and stock liquidity of AIM firms from 2010 to 2016. As stated in the literature review, none of the previous studies have conducted their investigations in the AIM. As a result, this study has contributed to the literature by studying an important topic in finance in an emerging, growing stock market which is one of the most successful in the world. Regarding the methodology, the study employs different components of ownership identity, i.e. free float ownership, investment bank ownership, foreign ownership, government ownership, pension fund ownership, employee ownership, cross-holding ownership and other-holding ownership, together with various measures of stock liquidity (both informational and real frictions). Besides this, the main method of the study is the system GMM, which can take into account different sources of endogeneity problems.

Based on the results of the main tests, the findings obtained indicate that firms listed on the AIM with higher free float ownership, foreign ownership and pension fund ownership tend to exhibit higher stock liquidity. In contrast, firms with higher investment bank ownership, government ownership, employee ownership, cross-holding ownership and other-holding ownership tend to exhibit lower stock liquidity. Furthermore, these results hold up even after employing three robustness checks, i.e. the use of alternative measures of stock liquidity, controlling for trading activity and adding more control variables.

Chapter 8 Research Summary and Conclusion

8.1 Overview of the Research

The aims of this thesis focus on three main studies which examine the association between stock liquidity and (1) corporate governance quality, (2) ownership structure and (3) ownership identity of firms listed on the Alternative Investment Market (AIM) from 2010 to 2016. Throughout the whole thesis, all three empirical studies being investigated have been introduced, explained, discussed and analysed in detail. In particular, Chapter 1 introduced the background and motivation of the research, based on which the topics of stock liquidity, corporate governance quality, ownership structure and ownership identity were chosen as the core. In addition, a quick review of the literature was provided, from which the study's contributions were identified. Across the three empirical studies, a common factor is the investigation in the AIM market of the UK. Therefore, moving on to Chapter 2, details about the AIM market were provided with the purpose of justifying the importance of this study into such a growing, emerging, and influential market.

Chapter 3 can be considered the foundation of the whole thesis, as it provides the theoretical framework as well as empirical evidence from the literature to support the hypothesised influences of corporate governance quality, ownership structure and ownership identity on stock liquidity. This thorough review of both theoretical and empirical literature is fundamental in capturing what has been covered by the literature in terms of academic as well as methodological contributions. Therefore, it acts as a guidance and support for every step and decision made during the implementation process of this thesis. Most importantly, the main hypotheses of the three empirical studies are primarily built on this chapter.

After the previous chapters had built the foundation of the whole thesis skeleton, Chapter 4 focused on the statistical tools used to achieve the set objectives, i.e. the methodology. During the research process, certain choices and trade-offs are indispensable regarding study sample and period (Section 4.2), variable choices and measures (Section 4.3), and the statistical method employed (Section 4.4). Therefore, in this chapter, details of the data sample, measures for the key variables (including stock liquidity, corporate governance quality, ownership structure, and ownership identity) and controlling variables are explained in detail with the support of the literature. In brief, the investigation was conducted on firms listed in the FTSE AIM All-Share Index over a seven-year period from 2010 to 2016. After applying the key criteria, the final

sample comprises 595 non-financial firms (i.e. 4,165 observations over time). The employed data was collected manually and from different database sources. More details about this are provided in Section 4.1. In addition to the main academic contribution – that this thesis is the first to investigate the three factors influencing stock liquidity in the AIM – other methodological contributions are noted. Specifically, the study exhibits comprehensive coverage of various aspects of corporate governance, ownership structure, ownership identity and stock liquidity, which previous studies have not been able to capture all in a single work. Overall, data collection is considered one of the most challenging tasks, and must be done with the utmost care and patience. Nevertheless, the implementation of the data-collection process can be deemed highly successful.

The next three chapters (Chapter 5 to Chapter 7) mainly provided the statistical results obtained and discussed those findings in detail. The results were drawn on the main estimation model used in this thesis, which was system GMM. This method was preferred over the traditional OLS and fixed effect method because it can simultaneously tackle the issues of serial correlation, heteroscedasticity and endogeneity – i.e. simultaneity, unobservable heterogeneity, and dynamic endogeneity. Justification for such a choice can be found in Section 4.4.2. In addition to the main test, a number of robustness tests were also employed to confirm and back up the findings obtained.

In this chapter, the whole thesis will be summarised and evaluated. All previous chapters will be combined into one whole picture, with further discussion on the practical implications and recommendations for future research. In brief, the study has successfully achieved the objectives set at the beginning and improved the understanding of the influences of corporate governance quality, ownership structure and ownership identity on the stock liquidity of AIM firms. The subsequent section will provide a better insight into the key findings of this thesis.

8.2 Summary of the Research Objectives

In the aftermath of the financial scandals and collapses of firms worldwide, as well as the financial crisis of 2007–2009, corporate governance mechanisms have received great attention from academics and policymakers, since a lot of blame has been put on inadequate or ineffective corporate governance mechanisms, e.g. boards of directors, as a reason for the emergence of the crisis (Akbar et al., 2017, McNulty et al., 2013, Beltratti and Stulz, 2012). Accordingly, the existing literature indicates that effective corporate governance quality

enhances both operational and financial transparency, which triggers a reduction in asymmetric information between insiders (e.g. firm managers) and external shareholders (e.g. large shareholders), as well as among external shareholders, and therefore improves stock liquidity (Chung et al., 2010, Ali et al., 2017).

However, the topic of corporate governance quality and stock liquidity has only been an area of focus for academic researchers since 2010. Furthermore, the extant studies on this topic have focused on the US (Chung et al., 2010), France (Karmani and Ajina, 2012), Australia (Ali et al., 2017) and emerging stock markets such as Malaysia, China and Thailand (Foo and Zain, 2010, Lei et al., 2013, Prommin et al., 2014). To the best of my knowledge, no study has been done in the UK. As a result, this study contributes to the literature by conducting its investigation in the UK's AIM stock exchange. Furthermore, it is noted that these prior studies tend to examine certain governance categories (e.g. only board composition and board committees (Prommin et al., 2014, Ali et al., 2017, Karmani and Ajina, 2012). On the other hand, this study comprehensively captures 40 governance standards of the QCA Code, which can be distributed across four main categories: board composition; board committees; board transparency, and remuneration policy structure. Thus, the first question of this thesis is: does corporate governance quality influence stock liquidity on the AIM?

The causes of the 2007 crisis are also attributed to the passive and weak monitoring of firm management by institutional shareholders (Dang et al., 2019, Díez-Esteban et al., 2016, Poon et al., 2013). Such weak monitoring may cause managers to become opportunistic and expropriate the wealth of minority shareholders (Grossman and Hart, 1986, Jensen and Meckling, 1976). Therefore, control–ownership separation is adversely associated with stock liquidity due to agency problems and asymmetric information (Chu et al., 2015, Attig et al., 2006). This brought the topic of ownership structure and stock liquidity to the fore. Nevertheless, the majority of studies examining this relationship have been conducted in the US market (e.g., Brockman et al., 2009, Fehle, 2004, Heflin and Shaw, 2000, Jacoby and Zheng, 2010, Kini and Mian, 1995, Poon et al., 2013, Rubin, 2007), with very few studies focused on the UK market (e.g., Iskandrani et al., 2015, Park, 2009). As a result, the current study contributes to the limited studies in the UK and extends the research focus to the AIM, an important market of the UK which exhibits different composition of ownership structures and lower investor protection compared to the main markets (Mortazian et al., 2018).

Besides this, prior studies have focused on a limited range of ownership structures with stock liquidity, e.g. ownership concentration (e.g., Heflin and Shaw, 2000), institutional ownership (e.g., Ajina et al., 2015) and insider ownership, institutional ownership and ownership concentration together (e.g., Rubin, 2007). Extending these, the current study examines various ownership structures, i.e. insider ownership, institutional ownership, concentrated ownership and minority shareholders. Thus, the second question of this thesis is: does ownership structure influence stock liquidity on the AIM?

Following the research flow of the thesis, the last empirical study aims to examine ownership identity on stock liquidity. Following the financial crisis of 2007–2009, the Financial Reporting Council (FRC) emphasised the important role of institutional shareholders in monitoring the boards of firms (FRC, 2010a). The literature also argues that the effective roles of large shareholders are an important mechanism in monitoring firm managers and therefore reducing agency problems (Bhide, 1993, Shleifer and Vishny, 1997, Ginglinger and Hamon, 2012). Nonetheless, not all types of institutions can monitor the management of the firm due to the differences in their levels of concentration (Næs, 2004, Jennings et al., 2002), fiduciary responsibilities and investment horizons (Chung and Zhang, 2011), and behaviours (Coffee, 1991). As noted by Chung and Zhang (2011) and Jennings et al. (2002), the effects of different institutional identities on stock liquidity vary from one to another. As a result, the current study examines the effects of a wide range of ownership identities, i.e. free float ownership, investment bank ownership, foreign ownership, government ownership, pension fund ownership, employee ownership, cross-holding ownership and other-holding ownership on stock liquidity. Thus, the third question of this thesis is: does ownership identity influence stock liquidity on the AIM?

8.3 Summary of the Research Findings

8.3.1 Corporate Governance Quality and Stock Liquidity (Chapter 5)

This section considers the empirical findings from Chapter 5, which examined the impact of corporate governance quality on informational friction and real friction, i.e. stock liquidity. Based on the literature review (Section 3.3.1), prior studies have concluded that firms with higher corporate governance quality tend to have higher stock liquidity. According to these findings, ***hypothesis 1*** was developed:

Hypothesis 1: "Corporate governance quality is positively related to stock liquidity", was supported and the positive effect of corporate governance quality was obtained.

The results of hypothesis 1 have been reported by prior studies in the literature (Chung et al., 2010, Karmani and Ajina, 2012, Lei et al., 2013, Prommin et al., 2014, Jiang et al., 2014, Ali et al., 2017). The positive relationship is in line with agency theory, which indicates that effective corporate governance quality can reduce agency conflicts by enhancing both operational and financial transparency, which triggers a reduction in asymmetric information between insiders (e.g. firm managers) and external shareholders (e.g. large shareholders), as well as among external shareholders. Therefore, stock liquidity can be improved (Chung et al., 2010, Ali et al., 2017).

Besides this, the corporate governance quality index was replaced by each individual governance category, i.e. board composition, board committees, board transparency and board remuneration policy. The results also indicate that all aspects of corporate governance influence stock liquidity. Therefore, firms should pay attention to all of them rather than a particular aspect.

In addition to the direct effects of corporate governance quality on stock liquidity, the study employed the Baron and Kenny (1986) four-step mediation model in order to examine whether corporate governance quality improves stock liquidity through the enhancement of information disclosure. The results indicate that firms with higher corporate governance quality tend to enhance their information disclosure, which in turn improves stock liquidity.

8.3.2 Ownership Structure and Stock Liquidity (Chapter 6)

This section considers the empirical findings from Chapter 6, which examined the impact of ownership structure, i.e. insider ownership, institutional ownership, concentrated ownership and minority shareholders on informational friction and real friction, i.e. stock liquidity. Based on a thorough review of the literature (from Section 3.3.2.1 to Section 3.3.2.5), the following hypotheses were tested:

Hypothesis 1: "Insider ownership is negatively associated with stock liquidity", was supported and the negative effect of insider ownership was obtained.

The finding of hypothesis 1 is consistent with previous studies, such as Chiang and Venkatesh (1988), Iskandrani et al. (2015), Rubin (2007) and Zhou (2011). The negative relationship is in line with the adverse selection standpoint, which argues that informed ownership has greater information in comparison to other shareholders. Thus, asymmetric information arises, causing the market makers to widen the bid–ask spread to limit expected losses when trading with those informed traders. Therefore, stock liquidity is reduced (Easley and O'Hara, 1987, Glosten and Milgrom, 1985, Grossman and Hart, 1986, Kyle, 1985).

Hypothesis 2: "Institutional ownership is positively associated with stock liquidity", was rejected and the negative effect of institutional ownership was obtained.

The result for hypothesis 2 is not in line with most of the previous empirical studies in the US, (Brockman et al., 2009, Kini and Mian, 1995, Jennings et al., 2002, Rubin, 2007, Jiang et al., 2011, Fehle, 2004, Zhou, 2011), or with those on the main market of the UK (e.g., Iskandrani et al., 2015). These studies argue that institutional investors in the US hardly take action in monitoring firm management due to (1) the over-regulation of the trading of those institutions (Coffee, 1991) and (2) the fact that they trade more than other shareholders, i.e. insiders (e.g., Rubin, 2007). Hence, it is unlikely that they are informed.

Nevertheless, this negative influence of institutional shareholders may give an indication that the roles of institutional shareholders in the AIM may be different from their roles in the main market of the UK and the US in terms of corporate control. In particular, AIM firms are small, and the number of shares issued by those firms is mostly not as large as firms on the main markets. Therefore, it is more likely for institutional shareholders to hold a large proportion of AIM firms, which increases their incentives to monitor firm management. Hence, this increases the likelihood that institutional owners can obtain private information about the firms, and become informed traders.

Hypothesis 3: "Number of institutions is positively associated with stock liquidity", was supported and the positive effect of number of institutions was obtained.

This result of hypothesis 3 is consistent with prior studies, such as (Liu, 2013, Blume and Keim, 2012). They find that number of institutions has more positive and significant effect on stock liquidity than institutional ownership.

Hypothesis 4: "Significant ownership is negatively associated with stock liquidity", was supported and the negative effect of significant ownership was obtained.

Hypothesis 5: "Substantial ownership is negatively associated with stock liquidity", was supported and the negative effect of substantial ownership was obtained.

For hypotheses 4 and 5, significant ownership and substantial ownership are the two proxies of ownership concentration. The negative relationships obtained in both hypotheses are consistent with previous studies (e.g. (Brockman et al., 2009, Comerton-Forde and Rydge, 2006, Ginglinger and Hamon, 2012, Heflin and Shaw, 2000, Iskandrani et al., 2015, Jacoby and Zheng, 2010, Næs, 2004, Rubin, 2007, Prommin et al., 2016). Two explanations for the negative relationship between ownership concentration and stock liquidity are proposed based on (1) informational friction and (2) real friction. For the former, it is argued that ownership concentration, i.e. blockholder ownership, often trades on non-public information against non-blockholder ownership. Thus, blockholder ownership dampens stock liquidity by increasing the cost of informational friction. For the latter, it is argued that blockholder ownership tends to trade less than non-blockholder ownership. This leads to a reduction in the firm's trading activity and an increase in real friction costs by spreading the real costs over a small amount of trades (Brockman et al., 2009).

Hypothesis 6: "Minority ownership is positively associated with stock liquidity", was supported and the positive effect of minority ownership was obtained.

The result for hypothesis 6 is consistent with agency theory, such that it is difficult for minority shareholders to control firm managers due to their small stockholdings. Therefore, these shareholders usually have fewer resources and incentives to monitor firm managers (Ragazzi, 1981). In this case, asymmetric information is lower, and hence stock liquidity increases (Wang and Zhang, 2015).

8.3.3 Ownership Identity and Stock Liquidity (Chapter 7)

This section considers the empirical findings from Chapter 7, which examines the impact of ownership identity, i.e. free float ownership, investment bank ownership, foreign ownership, government ownership, pension fund ownership, employee ownership, cross-holding ownership and other-holding ownership on informational friction and real friction, i.e. stock

liquidity. Based on a thorough review of the literature (from Section 3.3.3.1 to Section 3.3.3.6), the following hypotheses are tested:

Hypothesis 1: "Free float ownership is positively associated with stock liquidity", was supported and the positive effect of free float ownership was obtained.

The result of hypothesis 1 is consistent with extant studies, such as Ding et al. (2016), Ginglinger and Hamon (2012) and Park (2009). It is argued that free float ownership can enhance stock liquidity by increasing the trading activity of the firm and reducing asymmetric information (Ding et al., 2016).

Hypothesis 2: "Investment bank ownership is associated with stock liquidity", was accepted and the negative effect of investment bank ownership was obtained.

The results for hypothesis 2 have indicated that higher ownership holdings by investment banks reduce stock liquidity. This finding is consistent with previous studies, e.g. Park (2009) and Liu (2013), and in line with the argument that investment bank ownership has more ability than other ownership identities to monitor managers. This is because investment banks are able to carry the information costs of becoming knowledgeable and informed (Hoshi et al., 1991). Hence, asymmetric information arises with this identity of ownership.

Hypothesis 3: "Foreign ownership is associated with stock liquidity", was accepted and the positive effect of foreign ownership was obtained.

The results of hypothesis 3 are consistent with studies by Dahlquist and Robertsson (2001), Næs (2004), Ding et al. (2017) and Lee and Chung (2018). The justification proposed for this association is that foreign ownership can enhance stock liquidity by lowering trading costs through increasing price discovery and trading activity (Ding et al., 2017, Lee and Chung, 2018).

Hypothesis 4: "Government ownership is negatively associated with stock liquidity", was supported and the negative effect of government ownership was obtained.

The result for hypothesis 4 is consistent with the literature (e.g. (Næs, 2004, Park, 2009, Tran et al., 2018). It is argued that government ownership contributes to increased agency problems and information asymmetry (Shleifer and Vishny, 1997, Chu et al., 2015). Also, governments are relatively inactive traders, leading to a reduction in stock liquidity (Tran et al., 2018).

Hypothesis 5: "Pension fund ownership is associated with stock liquidity", was accepted and the positive effect of pension fund ownership was obtained.

The result of hypothesis 5 is consistent with studies by Ajina et al. (2015) and Poon et al. (2013). The positive relationship may be because pension funds are considered liquidity-motivated shareholders (Bushee and Noe, 2000, Dennis and Strickland, 2002). They are able to achieve abnormal returns compared to other shareholders (Cremers and Nair, 2005, Dennis and Strickland, 2002). They trade often to achieve profits, which increases the trading activity of the firm and hence stock liquidity.

Hypothesis 6: "Employee ownership is negatively associated with stock liquidity", was supported and the negative effect of employee ownership was obtained.

The result of hypothesis 6 has been reported previously in the studies of Brockman et al. (2009) and Park (2009). This may be because employee ownership is associated with employee benefit plans, which tie employee payoffs to the firm's performance. These employment incentive contracts can align the interests of employees with managers, as well as providing greater monitoring and participation in decision making (O'Boyle et al., 2016).

Hypothesis 7: "Cross-holding ownership is negatively associated with stock liquidity", was supported and the negative effect of cross-holding ownership was obtained.

Hypothesis 8: "Other-holding ownership is negatively associated with stock liquidity", was accepted and the negative effect of other-holding ownership was obtained.

The results of hypotheses 7 and 8 are supported by the study by (Park, 2009). Regarding cross-holding ownership's negative association with stock liquidity, it is argued that cross-holding ownership may increase the potential for mergers and acquisitions, as well as changing decision-making processes and corporate strategies due to informational advantages (Brooks, Chen, & Zeng, 2018).

Brief conclusion: *According to findings obtained across the three empirical studies of this thesis, it can be concluded that corporate governance quality, ownership structures and ownership identities do influence the stock liquidity of firms listed on the AIM. In particular, the stocks of firms with higher quality of corporate governance mechanisms tend to be more liquid. It is worth noting that not only the overall quality of corporate governance, but also each individual aspect of corporate governance, can improve the stock liquidity of firms.*

Additionally, it is found that a number of ownership structures and identities can improve AIM firms' stock liquidity. These are minority ownership, free float investors, foreign investors, pension funds and number of both institutions and of analysts following. In contrast, other ownership structures and identities, including insider ownership, institutional ownership, ownership concentration, investment banks, governments, employees, cross holdings and other holdings tend to dampen firms' stock liquidity.

Comparisons: *It should be noted that even though prior studies in the main market of the UK found that institutional ownership positively and significantly affects stock liquidity, for example (Iskandrani et al., 2015), institutional ownership in the AIM, a sub-market of the UK, is negatively and significantly related to stock liquidity. Additionally, foreign investors and pension funds found to be negatively and significantly related to stock liquidity in the main market of the UK, for instance (Park, 2009). Nevertheless, the two ownerships have a significant and positive relationship with stock liquidity in the AIM. These differences may possible denote that the roles of these ownerships in the AIM may possibly be different from their roles in the main market of the UK with regards to levels of concentration as well as corporate control. This is consistent with the Office for National Statistics, which asserts that, "AIM companies had different patterns of ownership to main market companies" (ONS, 2015, p. 23). A logical reason behind this may be the lower trading volumes of the AIM, which may make it more difficult for these institutions to perform a frequent turnaround of their investments in AIM stocks. As a result, institutional shareholders in AIM stocks may exercise more monitoring, since they are less likely to be able to unload their positions as frequently as in, for example, the main market of the UK. Thus, these shareholders may be regarded as informed traders and they are able to access private information about the firm.*

8.4 Implications of the Research

Given the assessment and understanding of stock liquidity and its determinants, in particular corporate governance quality, ownership structure and ownership identity, as fundamental drivers of healthy and sustainable corporations, this thesis provides a number of practical implications for a wide range of financial practitioners. These include (1) AIM firms' management teams, (2) AIM firms' stakeholders, especially shareholders, and (3) regulators.

(1) AIM firms' management teams: The study's findings suggest that there are two approaches for the management layer of firms listed on the AIM to improve firms' stock liquidity. The first approach is to construct higher-quality corporate governance mechanisms, focusing on all aspects including board composition, board committees, board transparency, and remuneration policy structure. Besides this, since the current corporate governance code for AIM firms is voluntary and subject to the concept of either comply or explain, the findings of this study might encourage managers consulting with NOMADs to adopt an effective corporate governance quality for their firms, which may assist in reducing information asymmetry between informed and uninformed traders by increasing levels of disclosure. The second approach is that firms should adjust the structure of their ownership so that a greater share of firms' stakes can be offered to liquidity-motivated shareholders, e.g. minority shareholders and particular limitations imposed on the percentage of shares maintained by strategic shareholders, e.g. insider ownership, corporations and government ownership. This action can be completed by means of increasing the firm's free float levels. As mentioned before, the free float levels in the AIM are not fixed, whereas the minimum levels are based on the decision made by NOMAD and manager. Thus, increasing the firm's free float levels can enhance stock market liquidity since it (A) decreases the number of shares available for those large informed shareholders and (B) increases the number of shares available for the public.

(2) AIM firms' stakeholders and especially shareholders: Stakeholders, and especially shareholders, can assess firms' stock liquidity, information asymmetry and agency issues by looking at which governance and ownership constructs AIM firms exhibit. The findings could be useful for investors in general and minority shareholders in particular, since they can avoid investing in firms that have weak governance and therefore trade against informed traders. In contrast, investing in firms with good corporate governance may provide the investors with both higher levels of information disclosure due to the effective

governance established by the firm, and higher stock liquidity, which allows them to sell/buy their stocks whenever they need. Another example of the importance of the study's findings for investors is that they can invest in firms that are followed by a high number of analysts. The study reveals that firms with more analysts tend to have more stock liquidity due to their greater effort in disclosing information about the firm. Investors therefore may get the benefits of this disclosed information, which may assist them in making their investment decisions.

(3) UK regulators: On the one hand, the AIM is characterised by a more flexible environment, e.g. lenient regulation regime, disclosure and low listing costs. According to prior studies on this market, these characteristics are considered the main reasons behind the success of the small and growing firms listed on this market. On the other hand, these light regulations may cause harmful financial behaviour such as fraud, scandal and manipulation. One example is the accounting discrepancies (about £2m error in its 2018 results) of the Eddie Stobart Company. As a result, the firm immediately suspended trading of its shares and announced that the chief executive was standing down. Another example is the accounting fraud at the Patisserie Valerie Company in 2018, which led to collapse into administration. The collapse followed the finding of a huge black hole in the company's accounts, valued at approximately £94m. To properly deal with this issue, this study provides two suggestions for the UK's regulators:

(A) Although the code of corporate governance is voluntary for AIM firms (comply or explain), the UK's regulators should place more emphasis on AIM firms having good corporate governance, i.e. governance that is appropriate for their size, needs, structures and natures. This can be achieved by following the guidelines of the QCA Corporate Governance Code. These corporate governance practices (e.g., monitoring firms' managers, the role of independent directors, board committees, etc.) can mitigate such bad behaviour and support firms' long-term sustainable success.

(B) Another suggestion for the UK's regulators is to place more emphasis on the importance of the role of Nominated Advisers and their full commitment to overseeing their firms. However, these Advisers each represent a large number of AIM firms, e.g., finnCap Ltd (93), Cenkos Securities PLC (77), Nplus1 Singer Advisory LLP (55) and W.H. Ireland Limited (55). To increase the performance and supervision of these Advisers, this study suggests employing a specific standard (e.g., number of employees and/or supervisors that are working with the Nominated Adviser) to specify the number of firms they can supervise. This may reduce the number of AIM firms supervised by

each Nominated Adviser, which ultimately may improve the supervision role of these Advisers.

8.5 Research Limitations

Despite extensive amounts of time and effort having been spent on this thesis, the research is still exposed to some limitations. First, due to the employment of the system GMM estimation method, pre-set criteria, e.g. five consecutive years of operation, were applied in the data sample, causing a number of firms to be excluded. Nevertheless, it is critical to resolve the issue of endogeneity in order to ensure the robustness of the findings. As a result, this thesis has chosen to follow the previous literature in making such a decision (e.g., Florackis and Ozkan, 2009, Akbar et al., 2017, Charalambakis et al., 2008).

Second, as discussed in Section 4.2, the study covers a seven-year period from 2010 to 2016. It has been mentioned that collecting the data from 2010 can help to avoid the possible impacts of unobservable exogenous macroeconomic shocks on small and growing firms during the global financial crisis of 2007–2009, which may potentially distort the impacts of corporate governance and ownership structure on stock liquidity. This study ends in the year 2016 because both corporate governance quality and information disclosure data are manually collected from AIM firms' annual reports and websites (i.e. about 4000 annual reports have been read). Thus, it is challenging to extend the time frame of the study because it takes a long time.

Third, the AIM is considered a worthy investment pool for foreign capital, where the number of international firms listed in the AIM is about 345 out of 982 firms in 2016. These international firms are from different regions, e.g. Africa, Australasia, Europe, etc. To investigate the effects of corporate governance quality, ownership structure and ownership identity on stock liquidity, country-based effects should be taken into account. Nevertheless, country-level characteristics, such as culture, the uncertainty of economic policy, country corporate governance level (Deng et al., 2018), financial market segmentation, GDP, GDP growth rate and market capitalisation (Ng et al., 2016), for all the participated countries are challenging to collect given the data sources available and the time constraints of this PhD study.

8.6 Areas for Further Research

Previous sections of this chapter have summarised the whole thesis with discussions about the study's findings and implications. This final section aims at identifying future directions and research opportunities in the area. The results of this thesis provide evidence that corporate governance quality, ownership structure and ownership identity are determinants of stock liquidity in the AIM following the global financial crisis of 2007–2009. However, prior studies have argued that small and growing firms have been more vulnerable to financial turbulence and experienced more damaging consequences during the crisis compared to larger and more established firms (Cowling et al., 2012). Based on this, future research can therefore attempt to investigate these relationships during the crisis to figure out how these governance constructs of small and growing firms affect stock liquidity.

In addition, since the AIM has several international firms from different countries, future research can re-examine these effects on stock liquidity by controlling for country-level characteristics. This could provide different insights regarding the relationship between corporate governance quality, ownership structure, ownership identity and stock liquidity at a more comprehensive level.

Moreover, board structure is considered one of the most important mechanisms of corporate governance. However, the effects of board structure components, i.e. board independence (measured by the number of non-executive directors to the board size), board size (measured by total number of both executive and non-executive directors on the board), CEO/chairman duality (measured by a dummy variable) and existence of female directors (measured by the number of female directors to the board size) on stock liquidity have received little attention from academic research given their relevance within the field. Therefore, future research may consider working on this topic.

Furthermore, as discussed previously, small and growing firms listed on the AIM are not required to follow the UK Corporate Governance Code; instead they are encouraged to follow the QCA Code, which is less demanding. Together with other differences in the operations and structures between firms on the main market and firms on the AIM, e.g. investor protection, ownership composition and the role of NOMADs, future research may be interested in conducting a comparative study between the AIM and the main market regarding the

relationship between corporate governance quality, ownership structure, ownership identity and stock liquidity.

Finally, as discussed in Section 2.5, the NOMAD is considered the central structural feature of the AIM, since it plays an important role in the process of admission, evaluating a firm's overall suitability and appropriateness for the market and assisting the firm throughout its flotation process. More importantly, the NOMAD plays a significant role in advising and discussing with the board the adoption of appropriate practices of corporate governance for the firms it represents. Given its importance in designing the corporate governance structures of firms, future research could explore whether corporate governance quality affects stock liquidity through the NOMADs.

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Appendix A

As mentioned previously in Sections 4.4.1 and 4.4.2, corporate governance is endogenously determined (Wintoki et al., 2012, Hermalin and Weisbach, 2003, Ali et al., 2017), as is the ownership structure (Heflin and Shaw, 2000, Rubin, 2007, Poon et al., 2013, Ajina et al., 2015). The dynamic endogeneity may exist in both corporate governance (e.g., Wintoki et al., 2012) and ownership structure (e.g., Fahlenbrach and Stulz, 2009). Thus, following Wintoki et al. (2012), this section aims to investigate the effects of current corporate governance quality, ownership structure and ownership identity on past stock liquidity[53] and firm characteristics.

In this study, the dynamic endogeneity does exist in the models. Past stock liquidity variables and past financial characteristics of firms determine most of the present values of corporate governance quality, ownership structure and ownership identity. In detail, Appx A.1 indicates that past stock liquidity (both quoted bid-ask spread and turnover ratio) and past firm characteristics (e.g., return volatility, firm size, leverage and R&D) are significantly related to current corporate governance quality. This implies that past stock liquidity and past firm characteristics influence current corporate governance quality.

Appx A.2 and Appx A.3 also indicate that past stock liquidity (both quoted bid-ask spread and turnover ratio) and past firm characteristics are significantly related to current ownership structure variables. This implies that past stock liquidity and past firm characteristics influence current ownership structure.

Finally, Appx A.4 and Appx A.5 indicate that past stock liquidity (both quoted bid-ask spread and turnover ratio) and past firm characteristics are significantly related to current ownership identity variables. This implies that past stock liquidity and past firm characteristics influence current ownership identity.

[53] For brevity, only two measures of stock liquidity are employed, i.e. an informational friction - the quoted bid-ask spread (QBAS) and a real friction – the turnover ratio (TR).

Appx A. 1 Corporate Governance Quality, Past Stock Liquidity and Firm Characteristics

The table below reports the pooled OLS regression for the relationship between current corporate governance quality, past stock liquidity and firm characteristics. The current corporate governance quality is (CGQIAIM). The past stock liquidity includes both past quoted bid-ask spread (QBAS -1) and past turnover ratio (TR-1). The past control variables include share price (SHP-1), return volatility (RV-1), firm size (SIZE-1), financial leverage (LV-1) firm age (AGE-1), research and development expenditure (R&D-1), asset tangibility (AT-1) and trading volume (TV-1). Year dummies and industry dummies are inculded in all regressions. Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

VARIABLES	(1) CGQIAIM	(2) CGQIAIM
QBAS (-1)	-25.19***	
	(-18.82)	
TR (-1)		8.046*
		(1.73)
SHP (-1)	0.000	-0.000
	(1.18)	(-0.52)
RV (-1)	-0.000***	-0.000
	(-3.41)	(-1.57)
SIZE (-1)	0.002***	0.005***
	(4.11)	(4.58)
LV (-1)	-0.701***	-0.094***
	(-3.50)	(-2.64)
AGE (-1)	0.131***	0.092***
	(6.17)	(4.25)
R&D (-1)	0.033**	0.006**
	(2.13)	(2.07)
AT (-1)	0.403	1.332***
	(1.08)	(3.34)
TV (-1)	-0.000***	-0.000*
	(-3.68)	(-1.69)
Constant	27.92***	24.78***
	(41.94)	(28.76)
Observations	3,179	3,172
R-squared	0.22	0.12
Year Effect	YES	YES
Industry Effect	YES	YES

Appx A. 2 Ownership Structure, Past Quoted Bid-Ask Spread and Firm Characteristics

The table below reports the pooled OLS regression for the relationship between current ownership structure, past stock liquidity and firm characteristics. The current ownership structure variables include insider ownership (IO), institutional ownership (ITO), number of institutions (NITO), significant ownership (SGO), substantial ownership (SUBO), minority shareholders (MINO) and analysts following (AF). The past stock liquidity is quoted bid-ask spread (QBAS -1). The past control variables include share price (SHP-1), return volatility (RV-1), firm size (SIZE-1), financial leverage (LV-1) and firm age (AGE-1). Year dummies and industry dummies are inculded in all regressions. Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

VARIABLES	(1) IO	(2) ITO	(3) NITO	(4) SGO	(5) SUBO	(6) MINO	(7) AF
QBAS (-1)	1.131**	-5.387***	-14.24***	2.513***	-0.400**	-0.799***	-5.475***
	(2.12)	(-13.61)	(-10.89)	(8.58)	(-2.50)	(-6.46)	(-9.31)
SHP (-1)	0.000	-0.000***	-0.000**	0.000***	-0.000***	-0.000***	-0.000
	(1.08)	(-3.94)	(-2.24)	(5.52)	(-3.07)	(-5.23)	(-1.31)
RV (-1)	0.000**	-0.000*	-0.000	0.000***	-0.000***	0.000*	-0.000
	(2.25)	(-1.66)	(-0.23)	(3.15)	(-3.96)	(1.73)	(-1.01)
SIZE (-1)	-0.000**	0.000***	0.001***	-0.000**	0.000***	-0.000	0.005***
	(-2.04)	(3.37)	(4.18)	(-2.24)	(2.58)	(-0.77)	(5.67)
LV (-1)	0.000	-0.000*	-0.000	-0.000***	-0.000***	0.000	-0.005
	(1.04)	(-1.81)	(-0.00)	(-3.92)	(-5.05)	(0.38)	(-1.23)
AGE (-1)	-0.014**	0.015***	0.063***	0.004	0.008***	0.007***	0.009
	(-2.02)	(4.07)	(5.14)	(1.12)	(3.78)	(3.89)	(1.53)
Constant	1.232***	3.939***	4.049***	3.589***	3.682***	2.794***	1.299***
	(3.24)	(28.83)	(16.90)	(25.69)	(57.79)	(33.42)	(5.33)
Observations	3,071	3,050	3,151	3,155	3,154	3,122	3,161
R-squared	0.12	0.21	0.14	0.05	0.07	0.06	0.35
Year Effect	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
Industry Effect	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*

Appx A. 3 Ownership Structure, Past Turnover Ratio and Firm Characteristics

The table below reports the pooled OLS regression for the relationship between current ownership structure, past stock liquidity and firm characteristics. The current ownership structure variables include insider ownership (IO), institutional ownership (ITO), number of institutions (NITO), significant ownership (SGO), substantial ownership (SUBO), minority shareholders (MINO) and analysts following (AF). The past stock liquidity is past turnover ratio (TR -1). The past control variables include share price (SHP-1), return volatility (RV-1), firm size (SIZE-1), financial leverage (LV-1) and firm age (AGE-1). Year dummies and industry dummies are inculded in all regressions. Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

VARIABLES	(1) IO	(2) ITO	(3) NITO	(4) SGO	(5) SUBO	(6) MINO	(7) AF
TR (-1)	-0.304***	-1.126***	-7.477***	-0.063	-0.278***	0.126**	-1.664***
	(-3.05)	(-24.33)	(-5.70)	(-0.61)	(-4.25)	(2.46)	(-4.93)
SHP (-1)	0.000	-0.000**	-0.000	0.000***	-0.000***	-0.000***	-0.000*
	(0.88)	(-2.42)	(-0.78)	(4.24)	(-3.00)	(-4.95)	(-1.92)
RV (-1)	0.000**	-0.000	0.000	0.000***	-0.000***	0.000**	0.000
	(2.15)	(-0.38)	(0.14)	(2.74)	(-3.92)	(2.06)	(0.18)
SIZE (-1)	-0.000**	0.000***	0.081***	-0.000***	0.000***	0.000	0.008***
	(-2.46)	(4.08)	(6.44)	(-3.23)	(3.21)	(1.08)	(3.80)
LV (-1)	0.000	-0.000*	-0.000	-0.000**	-0.000***	0.000	-0.000
	(1.07)	(-1.78)	(-0.64)	(-2.48)	(-4.59)	(0.57)	(-0.29)
AGE (-1)	-0.012*	0.005	0.911***	0.008**	0.007***	0.006***	-0.092***
	(-1.81)	(1.28)	(7.47)	(2.09)	(3.43)	(3.33)	(-3.09)
Constant	1.305***	3.589***	55.60***	3.761***	3.643***	2.733***	-5.309***
	(3.47)	(24.69)	(8.58)	(27.19)	(58.52)	(33.28)	(-4.79)
Observations	3,063	3,042	3,142	3,144	3,145	3,114	3,150
R-squared	0.12	0.10	0.25	0.02	0.07	0.05	0.06
Year Effect	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
Industry Effect	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*

Appx A. 4 Ownership Identity, Past Quoted Bid-Ask Spread and Firm Characteristics

The table below reports the pooled OLS regression for the relationship between current ownership identity, past stock liquidity and firm characteristics. The current ownership identity variables include free float ownership (FFO), investment bank ownership (IBO), foreign ownership (FOO), government ownership (GO), pension fund ownership (PFO), employee ownership (EO), cross-holding ownership (CHO) and other-holding ownership (OHO). The past stock liquidity is past quoted bid-ask spread (QBAS -1). The past control variable is share price (SHP-1), return volatility (RV-1), firm size (SIZE-1), financial leverage (LV-1) and firm age (AGE-1). Year dummies and industry dummies are inculded in all regressions. Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

VARIABLES	(1) FFO	(2) ICO	(3) FOO	(4) GO	(5) PFO	(6) EO	(7) CHO	(8) OHO
QBAS (-1)	-18.23***	-17.01***	5.159	-0.429*	3.478**	11.30***	15.52***	0.300
	(-2.89)	(-7.64)	(1.02)	(-1.66)	(2.25)	(7.87)	(3.45)	(0.27)
SHP (-1)	-0.002***	-0.000**	0.000	0.041	0.000*	0.000	-1.468***	0.000
	(-3.67)	(-2.35)	(1.16)	(0.79)	(1.67)	(0.14)	(-4.08)	(0.97)
RV (-1)	0.007**	0.000	-0.004**	-0.000*	-0.000*	0.000***	0.000	-0.000
	(2.11)	(0.62)	(-2.37)	(-1.70)	(-1.71)	(2.88)	(0.01)	(-0.37)
SIZE (-1)	0.005***	0.000	0.006***	-0.000	-0.000	-0.000	0.002	0.003**
	(3.66)	(0.66)	(2.76)	(-0.43)	(-0.40)	(-1.18)	(1.57)	(2.19)
LV (-1)	-0.000	-0.000	-0.000	-0.001	0.000	0.033**	0.150***	0.000
	(-1.14)	(-0.21)	(-0.15)	(-1.24)	(0.94)	(2.54)	(2.82)	(0.63)
AGE (-1)	0.162*	-0.054	-0.627***	-0.006	-0.024	-0.017	-0.090	0.035**
	(1.91)	(-1.13)	(-7.38)	(-0.50)	(-1.36)	(-0.65)	(-1.24)	(1.97)
Constant	78.45***	9.406***	12.56***	1.765***	-0.155	-3.364***	17.56***	-0.419
	(22.25)	(6.03)	(7.08)	(3.55)	(-0.66)	(-3.61)	(5.96)	(-1.29)
Observations	3,158	3,128	3,129	3,124	3,126	3,128	3,128	3,128
R-squared	0.16	0.09	0.08	0.01	0.01	0.08	0.06	0.04
Year Effect	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
Industry Effect	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*

Appx A. 5 Ownership Identity, Past Turnover Ratio and Firm Characteristics

The table below reports the pooled OLS regression for the relationship between current ownership identity, past stock liquidity and firm characteristics. The current ownership identity variables include free float ownership (FFO), investment bank ownership (IBO), foreign ownership (FOO), government ownership (GO), pension fund ownership (PFO), employee ownership (EO), cross-holding ownership (CHO) and other-holding ownership (OHO). The past stock liquidity is past turnover ratio (TR -1). The past control variables include share price (SHP-1), return volatility (RV-1), firm size (SIZE-1), financial leverage (LV-1) and firm age (AGE-1). Year dummies and industry dummies are inculded in all regressions. Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

VARIABLES	(1) FFO	(2) ICO	(3) FOO	(4) GO	(5) PFO	(6) EO	(7) CHO	(8) OHO
TR (-1)	4.484***	-1.362**	-3.246	-0.032	-0.281**	-2.476*	-3.988***	-0.168*
	(3.51)	(-2.14)	(-1.60)	(-0.71)	(-2.57)	(-1.78)	(-3.34)	(-1.92)
SHP (-1)	-0.002***	-0.000*	0.000	-0.000	0.000	0.001***	-1.007***	0.000
	(-3.39)	(-1.85)	(1.10)	(-0.74)	(0.85)	(2.79)	(-2.88)	(0.97)
RV (-1)	0.007**	0.000	-0.004**	0.000	-0.000	0.002	-0.000	-0.000
	(1.99)	(0.32)	(-2.31)	(0.02)	(-1.26)	(0.91)	(-0.12)	(-0.36)
SIZE (-1)	0.007***	0.002**	0.005***	-0.000	-0.000**	-0.008***	0.000	0.003**
	(4.11)	(2.05)	(2.66)	(-0.13)	(-2.36)	(-4.85)	(0.64)	(2.24)
LV (-1)	-0.000	-0.000	-0.000	0.000	0.000	0.000	0.174***	0.000
	(-1.07)	(-0.06)	(-0.17)	(0.47)	(0.91)	(0.42)	(3.21)	(0.61)
AGE (-1)	0.147*	-0.077	-0.617***	-0.006	-0.019	-0.317***	-0.080	0.035**
	(1.73)	(-1.59)	(-7.29)	(-0.54)	(-1.09)	(-3.52)	(-1.09)	(1.99)
Constant	82.36***	7.536***	5.669***	0.000	0.066	19.76***	19.58***	-0.444
	(28.04)	(4.96)	(3.40)	(0.00)	(0.36)	(10.50)	(6.78)	(-1.49)
Observations	3,147	3,120	3,121	3,116	3,118	3,120	3,120	3,120
R-squared	0.15	0.07	0.08	0.01	0.01	0.09	0.06	0.04
Year Effect	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
Industry Effect	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*

Appendix B

This section re-runs the baseline model using the OLS to determine whether the OLS results are similar to the results of the system GMM obtained in Sections 5.5.1, 6.5.1 and 7.5.1. It is apparent from Tables Appx B. 1, Appx B. 2, Appx B. 3 and Appx B. 4 that the OLS findings are relatively inconsistent with system GMM. For example, GMM finds a significant and positive relationship between corporate governance quality (CGQIAIM) and all stock liquidity variables (QBAS, PIR, TR, TS & NT). However, OLS finds a significant and positive relationship between corporate governance quality (CGQIAIM) and only two stock liquidity variables: QBAS and NT.

Appx B. 1 Effects of Corporate Governance Quality on Stock Liquidity (OLS)

The table below reports the results of the OLS using quoted bid–ask spread (QBAS) and price impact ratio (PIR) as proxies for informational friction and turnover ratio (TR), trade size (TS) and number of trades (NT) as proxies for real friction. The independent variable is the corporate governance quality (CGQIAIM). The control variables are share price (SHP), return volatility (RV), firm size (SIZE), firm age (AGE), research and development ratio (R&D), asset tangibility ratio (AT), financial leverage (LV) and trading volume (TV). Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	QBAS	PIR	TR	TS	NT
CGQIAIM	-0.472***	-0.011	-0.012	-0.001	0.253***
	(-8.96)	(-0.05)	(-0.24)	(-0.010)	(2.95)
SHP	-0.000***	-1.184***	0.000*	-0.075	0.000***
	(-7.21)	(-13.30)	(1.80)	(-0.59)	(5.22)
RV	0.000	0.001***	-0.000***	-0.000***	-0.000***
	(0.89)	(24.55)	(-5.93)	(-11.22)	(-4.88)
SIZE	-0.356***	0.323***	-0.025***	0.299***	0.382***
	(-38.48)	(10.53)	(-3.31)	(15.63)	(25.40)
AGE	0.019	-0.286***	-0.014	0.0981**	0.153***
	(1.30)	(-4.62)	(-0.88)	(2.31)	(5.58)
R&D	0.004**	-0.035***	-0.003	0.014**	0.010***
	(2.45)	(-3.47)	(-1.50)	(2.07)	(2.62)
AT	-0.000*	0.000	-0.000***	-0.000	0.000
	(-1.90)	(1.47)	(-4.03)	(-1.34)	(0.98)
LV	0.033**	-0.129**	-0.001	-0.071*	-0.028
	(2.24)	(-2.28)	(-0.08)	(-1.77)	(-0.97)
TV	-0.000***	-0.000***	0.000***	0.012***	0.000***
	(-5.01)	(-11.66)	(13.97)	(15.18)	(19.73)
Constant	-0.151	-2.359***	-5.793***	3.995***	0.067
	(-0.68)	(-3.01)	(-29.76)	(7.95)	(0.19)
Observations	3,770	3,770	3,706	3,770	3,770
R-squared	0.621	0.515	0.287	0.509	0.478

Appx B. 2 Effects of Ownership Structure on Stock Liquidity (OLS)

The table below reports the results of the OLS using quoted bid–ask spread (QBAS) and price impact ratio (PIR) as proxies for informational friction and turnover ratio (TR), and trading volume (TV) and number of trades (NT) as proxies for real friction. The independent variables are the ownership structure variables: insider ownership (IO), institutional ownership (ITO), number of institutions (NITO), substantial ownership (SUBO), significant ownership (SGO) and minority shareholders (MINO). The control variables are share price (SHP), return volatility (RV), firm size (SIZE), financial leverage (LV), firm age (AGE) and analyst following (AF). Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	QBAS	PIR	TR	TV	NT
IO	-0.000*	0.015***	-0.000*	-0.003***	-0.003***
	(-1.88)	(7.02)	(-1.77)	(-2.61)	(-3.87)
ITO	-0.001***	0.010***	-0.002***	-0.002*	-0.004***
	(-5.23)	(6.07)	(-4.82)	(-1.89)	(-6.28)
NITO	-0.008***	-0.078***	0.000	0.028**	0.020***
	(-2.57)	(-4.67)	(0.08)	(2.41)	(3.29)
SUBO	0.000	-0.009***	-0.00*	0.001	-0.004***
	(1.34)	(-3.53)	(-1.92)	(0.92)	(-3.81)
SGO	0.002***	0.006***	-0.004***	-0.006***	-0.006***
	(6.85)	(3.32)	(-8.50)	(-5.21)	(-8.40)
MINO	-0.005***	-0.043***	0.012***	0.036***	0.023***
	(-3.90)	(-6.06)	(6.08)	(7.38)	(7.70)
SHP	-0.000***	-1.770***	0.209***	1.768***	0.287***
	(-7.23)	(-20.79)	(7.92)	(29.13)	(9.69)
RV	0.000	0.001***	-0.000***	-0.000***	-0.000***
	(0.49)	(24.29)	(-7.22)	(-11.55)	(-4.83)
SIZE	-0.287***	0.363***	-0.038***	0.225***	0.337***
	(-30.0)	(10.57)	(-4.13)	(10.32)	(19.67)
LV	0.026*	-0.131***	0.003	-0.042	-0.008
	(1.95)	(-2.60)	(0.20)	(-1.06)	(-0.32)
AGE	0.086***	-0.099	-0.067***	-0.164***	0.035
	(5.78)	(-1.45)	(-3.47)	(-3.39)	(1.28)
AF	-0.099***	-0.076***	0.042***	0.084***	0.162***
	(-16.84)	(-3.16)	(6.49)	(6.78)	(14.65)
Constant	-1.634***	-2.214***	-5.609***	3.911***	1.496***
	(-12.67)	(-5.00)	(-52.5)	(11.87)	(6.53)
Observations	3,718	3,717	3,654	3,717	3,717
R-squared	0.680	0.531	0.220	0.484	0.509

Appx B. 3 Effects of Ownership Identity on Stock Liquidity (OLS)

The table below reports the results of the OLS using quoted bid–ask spread (QBAS) and price impact ratio (PIR) as proxies for informational friction and turnover ratio (TR), and trading volume (TV) and number of trades (NT) as proxies for real friction. The independent variables are investment bank ownership (IBO), foreign ownership (FOO), government ownership (GO), pension fund ownership (PFO), employee ownership (EO), cross-holding ownership (CHO) and other-holding ownership (OHO). The control variables are share price (SHP), return volatility (RV), firm size (SIZE), financial leverage (LV) and firm age (AGE). Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	QBAS	PIR	TR	TV	NT
IBO	-0.000	0.026***	-0.008***	-0.019***	-0.019***
	(-0.32)	(6.11)	(-7.74)	(-7.14)	(-10.29)
FOO	0.001**	-0.013***	-0.000	0.006***	0.003***
	(2.54)	(-4.92)	(-0.48)	(4.06)	(3.07)
GO	-0.003	-0.039**	0.002	0.018	0.012
	(-0.73)	(-2.21)	(0.67)	(1.35)	(1.62)
PFO	-0.000	0.025**	0.003	-0.004	0.000
	(-0.19)	(2.18)	(1.24)	(-0.48)	(0.08)
EO	0.004***	0.023***	-0.006***	-0.018***	-0.014***
	(8.00)	(9.13)	(-12.10)	(-11.72)	(-15.14)
CHO	0.003***	0.016***	-0.007***	-0.016***	-0.016***
	(5.00)	(4.92)	(-9.76)	(-8.19)	(-12.79)
OHO	0.008***	0.037***	-0.005***	-0.030***	-0.018***
	(4.85)	(6.29)	(-4.05)	(-7.54)	(-4.94)
SHP	-0.000***	-1.774***	0.207***	1.759***	0.000***
	(-7.92)	(-20.20)	(7.85)	(28.60)	(4.09)
RV	0.000	0.001***	-0.000***	-0.000***	-0.000***
	(1.29)	(23.88)	(-5.78)	(-11.11)	(-4.97)
SIZE	-0.373***	0.339***	-0.012	0.289***	0.383***
	(-40.95)	(11.65)	(-1.61)	(15.92)	(25.43)
LV	0.035**	-0.098*	-0.006	-0.080*	-0.022
	(2.49)	(-1.79)	(-0.33)	(-1.94)	(-0.84)
AGE	0.020	-0.126*	-0.053**	-0.111**	0.092***
	(1.20)	(-1.71)	(-2.34)	(-2.09)	(2.94)
Constant	-1.915***	-3.389***	-5.512***	5.098***	1.774***
	(-13.29)	(-7.88)	(-52.34)	(16.15)	(7.40)
Observations	3,585	3,585	3,523	3,585	3,585
R-squared	0.624	0.526	0.199	0.478	0.453

Appx B. 4 Effects of Free Float Ownership on Stock Liquidity (OLS)

The table below reports the results of the OLS using quoted bid–ask spread (QBAS) and price impact ratio (PIR) as proxies for informational friction and turnover ratio (TR), and trading volume (TV) and number of trades (NT) as proxies for real friction. The independent variable is free float ownership (FFO). The control variables are share price (SHP), return volatility (RV), firm size (SIZE), financial leverage (LV) and firm age (AGE). Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	QBAS	PIR	TR	TV	NT
FFO	-0.001***	-0.019***	0.003***	0.009***	0.007***
	(-3.61)	(-9.22)	(8.12)	(7.42)	(9.88)
SHP	-0.000***	-1.816***	0.234***	1.803***	0.324***
	(-6.94)	(-21.76)	(8.87)	(30.25)	(10.51)
RV	0.000	0.001***	-0.000***	-0.000***	-0.000***
	(0.77)	(23.51)	(-5.55)	(-10.88)	(-2.80)
SIZE	-0.378***	0.298***	-0.012	0.308***	0.437***
	(-43.7)	(10.50)	(-1.63)	(17.02)	(27.59)
LV	0.044***	-0.102**	-0.015	-0.083**	-0.037
	(3.13)	(-2.01)	(-0.76)	(-2.13)	(-1.33)
AGE	-0.004	-0.272***	-0.019	-0.005	0.158***
	(-0.32)	(-4.36)	(-1.05)	(-0.12)	(5.60)
Constant	-1.604***	-0.877**	-6.210***	3.478***	0.302
	(-18.82)	(-2.00)	(-58.22)	(10.99)	(1.21)
Observations	3,774	3,770	3,706	3,770	3,770
R-squared	0.609	0.510	0.140	0.449	0.418

Appendix C

This section re-examines the relationship between ownership identity and stock liquidity after taking out both government ownership and pension fund ownership from the model. The reason for removing the two variables is that they are minimal (holding only a small proportion of AIM firms). For example, government ownership and pension fund ownership have mean values of 0.17% and 0.31%.

However, it is apparent from Table Appx C. 1 that even after removing both government ownership and pension funds from the model, the results are still the same. In detail, investment banks, employees and cross-holdings have a negative effect on stock liquidity while foreign ownership have a positive influence on liquidity.

Appx C. 1 Effects of Ownership Identity on Stock Liquidity

The table below reports the results of the system GMM using quoted bid–ask spread (QBAS) and price impact ratio (PIR) as proxies for informational friction and turnover ratio (TR), and trading volume (TV) and number of trades (NT) as proxies for real friction. The independent variables are investment bank ownership (IBO), foreign ownership (FOO), employee ownership (EO) and cross-holding ownership (CHO). The control variables are share price (SHP), return volatility (RV), firm size (SIZE), financial leverage (LV) and firm age (AGE). Robust standard errors are employed for all t-statistics. T-statistics appear in parentheses. * * *, * * and * mean the variables have significance at 1%, 5% and 10% levels respectively. P-values of AR (1) are test for first order serial correlation and AR (2) are for second order serial correlation, under the null hypothesis of no serial correlation. P-values of the Hansen test of over-identification are under the null hypothesis that all instrumental variables are valid. P-values of the difference in Hansen test of exogeneity are under the null hypothesis that instrumental variables employed in levels are exogenous.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	QBAS	PIR	TR	TV	NT
IBO	0.008*	0.037***	-0.012**	-0.032***	-0.051***
	(1.90)	(3.16)	(-2.04)	(-4.87)	(-5.96)
FOO	0.000	-0.018*	0.000	0.010*	0.017***
	(0.07)	(-1.78)	(0.20)	(1.84)	(2.67)
EO	0.005***	0.014**	-0.010***	-0.025***	-0.031***
	(2.66)	(2.44)	(-2.76)	(-6.94)	(-7.04)
CHO	0.004	0.027**	-0.011*	-0.026***	-0.029***
	(1.52)	(2.35)	(-1.92)	(-3.50)	(-4.13)
SHP	-0.105***	-0.946***	0.104**	1.062***	0.094***
	(-6.17)	(-12.72)	(2.58)	(18.09)	(2.90)
RV	0.002	0.993***	-0.059**	-0.031	-0.140***
	(0.12)	(15.59)	(-2.24)	(-1.02)	(-3.53)
SIZE	-0.284***	-0.707***	0.061	0.818***	0.460***
	(-6.66)	(-4.85)	(1.26)	(7.41)	(5.95)
LV	-0.011	0.060	0.016	0.032	-0.053
	(-0.57)	(1.08)	(0.83)	(0.75)	(-1.16)
AGE	0.011	0.257**	-0.147**	-0.301*	-0.054
	(0.23)	(2.05)	(-2.11)	(-1.96)	(-0.53)
LIQUI-1	3.893***		31.31	0.000**	0.001***
	(5.59)		(1.60)	(2.26)	(3.52)
LIQUI-2	-0.867*				
	(-1.93)				
LIQUI-3	0.638				
	(1.63)				
Constant	-2.219***	-4.947***	-5.383***	7.477***	2.021***
	(-13.74)	(-9.12)	(-19.77)	(15.85)	(5.42)
Observations	1,997	1,994	1,937	1,994	1,994
AR (1) test	0.000	0.000	0.006	0.000	0.000
AR (2) test	0.605	0.119	0.161	0.114	0.158
Hansen test of over-identification	0.108	0.316	0.387	0.134	0.147
Diff in Hansen tests of exogeneity	0.208	0.641	0.701	0.163	0.205